



Aerospace Medicine  
and Biology  
A Continuing  
Bibliography  
with Indexes

NASA SP-7011(240)  
January 1983

National Aeronautics and  
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# **AEROSPACE MEDICINE AND BIOLOGY**

**A CONTINUING BIBLIOGRAPHY  
WITH INDEXES**

**(Supplement 240)**

**A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in December 1982 in**

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*

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# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 357 reports, articles and other documents announced during December 1982 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

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An annual index will be prepared at the end of the calendar year covering all documents listed in the 1982 Supplements.

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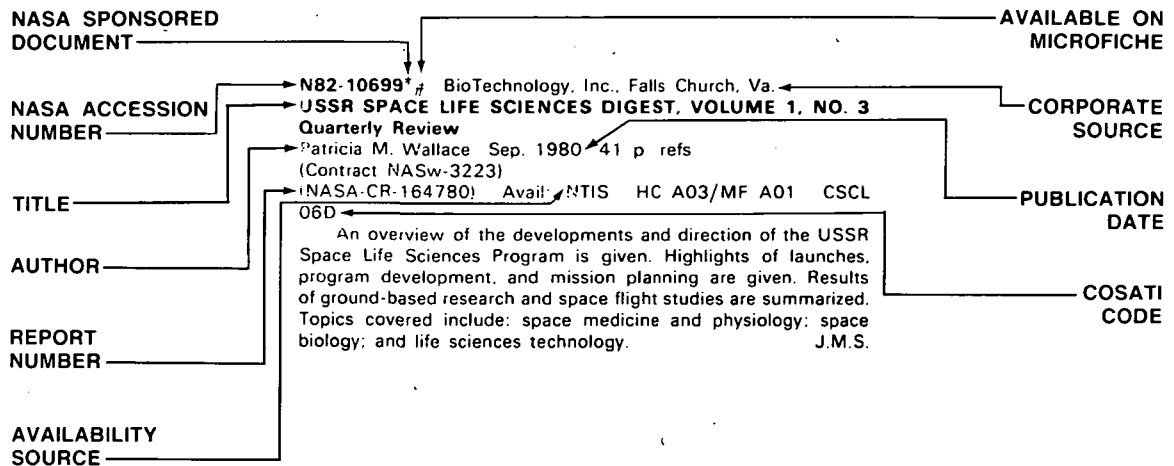
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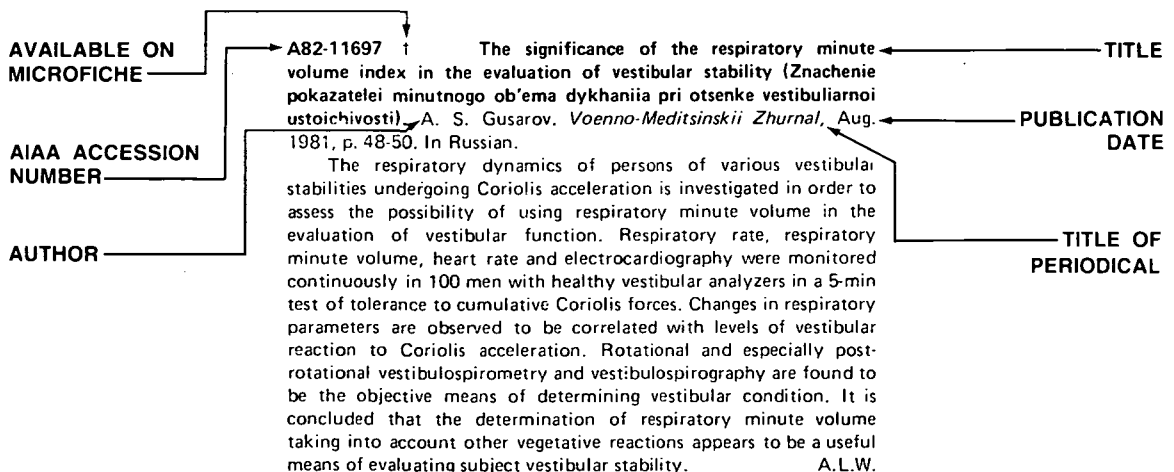
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## TYPICAL CITATION AND ABSTRACT FROM IAA



# AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 240)

JANUARY 1983

## IAA ENTRIES

**A82-45179 # The Biorack programme - A European contribution to space biology.** A. F. L. Soons (ESA, Special Projects Div., Noordwijk, Netherlands). *ESA Bulletin*, no. 31, Aug. 1982, p. 46-51.

The Biorack project has recently been approved by Council as part of the Agency's Microgravity Programme. The Biorack is a multipurpose facility for performing biological investigations on such life forms as plants, tissues, cells, bacteria and insects. It will be used to determine the effects of zero-g and the space-radiation environment, and will carry facilities for: life support; environmental support; experiment-specimen handling, preservation and examination; and also for performing 1-g reference measurements while in orbit. Development work started formally in February 1982 and the aim is to fly the Biorack on the German Spacelab D-1 mission in 1985. (Author)

**A82-45200 \* Computer assessment of atherosclerosis from angiographic images.** R. H. Selzer (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA), D. H. Blankenhorn, S. H. Brooks, D. W. Crawford, and W. L. Cashin (Southern California, University, Los Angeles, CA). *IEEE Transactions on Nuclear Science*, vol. NS-29, June 1982, p. 1198-1207. 16 refs. NASA-supported research; Grants No. NIH-HL-14138; No. NIH-HV-72930.

A computer method for detection and quantification of atherosclerosis from angiograms has been developed and used to measure lesion change in human clinical trials. The technique involves tracking the vessel edges and measuring individual lesions as well as the overall irregularity of the arterial image. Application of the technique to conventional arterial-injection femoral and coronary angiograms is outlined and an experimental study to extend the technique to analysis of intravenous angiograms of the carotid and coronary arteries is described. (Author)

**A82-45575 Sleep schedules and peak times of oral temperature and alertness in morning and evening 'types'.** J. Foret (CNRS, Laboratoire de Physiologie Neurosensorielle, Paris, France), O. Benoit, and S. Royant-Parola (Institut National de la Santé et de la Recherche Médicale, Paris, France). *Ergonomics*, vol. 25, Sept. 1982, p. 821-827. 19 refs.

The relation between circadian variables (oral temperature and subjective alertness) and sleep-awake schedules was explored as a function of a subjective preference index (Horne and Ostberg, 1976) which classifies subjects as 'morning' or 'evening' type. Measurements of oral temperature and self-assessed alertness were obtained every three hours from rising time to bedtime over a two week period in 49 medical students. Sleep logs were kept by the students during the same period. Sleep schedules and alertness peak time, as well as the relative temporal location of alertness peak time and temperature peak time, differed in relation to the Horne and Ostberg index. These results suggest that in normal conditions the coupling between temperature circadian rhythm and sleep-awake cycle differs in morning types and evening types. (Author)

**A82-45592 A protective function of the coacervates against UV light on the primitive earth.** H. Okihana and C. Ponnampuruma (Maryland, University, College Park, MD). *Nature*, vol. 299, Sept. 23, 1982, p. 347-349. 18 refs.

The ability of coacervates to absorb glycine or diglycine from and protect these substances against decomposition from UV radiation was studied in an investigation of conditions of primitive life on the early earth. Polyvinyl alcohol (PVA-S) and partially amino-acetylated alcohol (PVA-A) compounds with 3000 and 78,000 values for molecular weights and esterifications of 4.99 mol % and 34.1 mol % were mixed in a NaKO buffer at room temperature to form the coacervates. Coacervate droplets display concentrations and distributions which differ from the external medium. Glycine or diglycine was added to the solution before or after coacervate formation in a series of trials. Higher concentrations than in solution displayed by the droplets, which were exposed to UV radiation comparable to the solar spectra. Significantly less glycine and diglycine decomposition was observed in solutions containing coacervates, indicating that primitive microsystems in the primordial sea may have selectively concentrated specific

ingredients, protected them from destruction from radiation, and thereby contributed to further development of complex molecules necessary for life to evolve. M.S.K.

**A82-45626 Mapping the primate visual system with /2 - C-14/deoxyglucose.** K. A. Macko, C. D. Jarvis, C. Kennedy, M. Miyaoka, M. Shinohara, L. Sokoloff, and M. Mishkin (U.S. Public Health Service, National Institute of Mental Health, Bethesda, MD). *Science*, vol. 218, Oct. 22, 1982, p. 394-397. 21 refs.

The /2 - C-14/deoxyglucose method was used to identify the cerebral areas related to vision in the rhesus monkey (*Macaca mulatta*). This was achieved by comparing glucose utilization in a visually stimulated with that in a visually deafferented hemisphere. The cortical areas related to vision included the entire expanse of striate, prestriate, and inferior temporal cortex as far forward as the temporal pole, the posterior part of the inferior parietal lobule, and the prearcuate and inferior prefrontal cortex. Subcortically, in addition to the dorsal lateral geniculate nucleus and superficial layers of the superior colliculus, the structures related to vision included large parts of the pulvinar, caudate, putamen, claustrum, and amygdala. These results, which are consonant with a model of visual function that postulates an occipito-temporo-prefrontal pathway for object vision and an occipito-parieto-prefrontal pathway for spatial vision, reveal the full extent of those pathways and identify their points of contact with limbic, striatal, and diencephalic structures. (Author)

**A82-45673 Steady state visual evoked potentials in the alert primate.** K. Nakayama and M. Mackeben (Smith-Kettlewell Institute of Visual Sciences, San Francisco, CA). *Vision Research*, vol. 22, no. 10, 1982, p. 1261-1271. 34 refs. Grants No. NIH-5R01-EY-01582; No. NIH-R01-EY-03598; No. NIH-5P30-EY-01186.

The pattern of steady state visual evoked potentials (SSVEP) in response to counterphase modulated sinusoidal gratings is investigated in alert macaque monkeys as part of a study of appropriate animal models for human visual evoked potentials. Results show that the SSVEP can exhibit either broad or narrow spatial frequency tuning, depending on electrode location, temporal frequency, contrast and method of analysis. The SSVEP can also exhibit narrow temporal frequency tuning, as narrow as 0.5 octave at half height. The contrast functions relating VEP amplitude to log contrast are found to be highly nonlinear. In addition, extrapolation of the low contrast function to zero voltage leads to an excellent match with psychophysical functions, while a similar extrapolation of the high voltage contrast function leads to a contrast value much higher than the psychophysical threshold. It is concluded that the SSVEP can reflect the activity of two distinct neural mechanisms responsive to pattern stimulation, and the degree to which either mechanism is evident determines the spatial and temporal frequency tuning of the VEP. N.B.

**A82-45674 Effect of motion sweep duration and number of stations upon interpolation in discontinuous motion.** M. J. Morgan and R. J. Watt (University College, London, England). *Vision Research*, vol. 22, no. 10, 1982, p. 1277-1284. 14 refs. Research supported by the Medical Research Council.

Spatial and temporal vernier offset thresholds are measured for a target moving in discrete spatial steps between stations. In the spatial case, the two bars comprising the target have a relative spatial offset at each station but are synchronous, while in the temporal case the two bars appear at aligning stations with a temporal asynchrony. The distance the target would have travelled during the temporal delay is used to convert the temporal thresholds into spatial units. In this way, temporal and spatial thresholds are very similar if the duration of the motion sequence is 300 msec or greater, but at shorter durations temporal thresholds become progressively higher. The possibility that eye pursuit might account for these data is ruled out by recording eye movements and rejecting trials on which tracking occurred. From the analyses of eye records, it is found that some tracking can occur even when the duration of the motion sequence is as little as 150 msec and random in direction. N.B.

**A82-45675 Spectral sensitivity of the peripheral retina to large and small stimuli.** T. K. Kuyk (Florida State University, Tallahassee, FL). *Vision Research*, vol. 22, no. 10, 1982, p. 1293-1297. 29 refs. Grants No. NIH-EY-01394; No. NIH-EY-03039.

Increment-threshold spectral sensitivity functions are examined at several retinal locations using different sized targets under conditions known to favor detection by the opponent-color system. Results show that for the fovea and parafovea at 4 degrees, a 1 degree, 250 msec stimulus of variable wavelength, flashed on a 1,000 td white background, yields spectral sensitivity curves with three distinct maxima located near 455, 530-540, and 600 nm. It is found that as eccentricity increases so does the minimum spot size needed to produce spectral curves with three peaks. Smaller stimuli in the periphery yields curves with a minor peak at 455 nm, present under some conditions, and a major broad peak at 560 nm that resembles the CIE photopic luminosity function. It is concluded that the three-peaked curves indicate mediation by the opponent-color system while the other type of function can be attributed to the non-opponent system. N.B.

**A82-45772 †** The early reactions of cells to ionizing radiation and their role in protection and sensitization (Rannie reaktsii kletok na ioniziruiushchee izluchenie i ikh rol' v zashchite i sensibilizatsii). G. S. Kalendo. Moscow, Energiizdat, 1982. 97 p. 127 refs. In Russian.

The bases of the current principles of the modification of radioactive influences on cells are examined, focusing on the failures of the natural protective reactions of cells. Cells respond to irradiation, as well as to other damaging influences, with a multifarious nonspecific reaction which has an adaptive character. A rapid inhibition of the proliferation of the cells and an activation of their recovery systems are included in this comprehensive response, along with other reactions. A heightening of the cells' radiation sensitivity is produced by the failure of the nonspecific early protective reactions of the cells by short-lived nonspecific proliferation processes with weak irritability, including weak doses of ionizing radiation. A weakening of the effects, on the other hand, can be achieved by a preliminary inhibition of the ongoing proliferation. N.B.

**A82-45776 †** The influence of activators of cAMP accumulation on individual stages of genome expression in animal cells in the presence of acute ionizing radiation. IV - A study of the cytosol factors controlling the transcription and release of RNA from the nuclei in irradiated animals and in conditions of the action of the radioprotective agent serotonin (Vlianie aktivatorov nakopleniia tsAMF na otdel'nye etapy ekspressii genoma v kletkakh pri ostrym luchevom porazhenii organizma. IV - Izuchenie faktorov tsitozola kontroliruiushchikh transkriptsii i vykhod iz lader RNK v obluchennom organizme i v usloviakh deistviia radioprotektora serotonin). B. A. Tsudzevich, L. A. Galkina, and N. E. Kucherenko (Kievskii Gosudarstvennyi Universitet, Kiev, Ukrainian SSR). *Radiobiologiya*, vol. 22, July-Aug. 1982, p. 435-440. 15 refs. In Russian.

**A82-45777 †** The induction of reversions to prototrophy in *Escherichia coli* cells under the influence of neutrons and gamma radiation (Induktsiia reversii k prototrofnosti u kletok *Escherichia coli* pod deistviem neutronov i gamma-izlucheniia). V. A. Sokolov, M. N. Miasnik, and S. P. Kapchigashev (Akademiia Meditsinskikh Nauk SSSR, Obninsk, USSR). *Radiobiologiya*, vol. 22, July-Aug. 1982, p. 466-470. 25 refs. In Russian.

**A82-45778 †** An investigation of the postirradiation dynamics of lymphopoiesis using a mathematical model (Issledovanie postradiatsionnoi dinamiki limfopoeza metodami matematicheskogo modelirovaniia). O. A. Smirnova, R. D. Govorun, and N. I. Ryzhov. *Radiobiologiya*, vol. 22, July-Aug. 1982, p. 488-493. 12 refs. In Russian.

A mathematical model is developed for the dynamics of the impairment and recovery of lymphopoiesis in irradiated animals. The model uses a system of linear differential equations to describe the concentrations of lymphocytes of the peripheral blood and their precursors in the bone marrow that are damaged and not damaged by ionizing radiation. A comparison with experimental data shows that the model provides a qualitative, and sometimes quantitative, assessment of the processes of the depopulation of the lymphoid and bone marrow tissues and the processes of their replenishment. N.B.

**A82-45779 †** The activity of ribosephosphate pyrophosphokinase in the thymus and liver of irradiated mice (Aktivnost' ribozofosfatpirofosfokinazy v timuse i pecheni obluchennykh myshei). V. B. Kolina, E. V. Kuznetsova, N. N. Koshchenko, and E. F. Romantsev. *Radiobiologiya*, vol. 22, July-Aug. 1982, p. 512-514. 16 refs. In Russian.

**A82-45780 †** The effect of ionizing radiation on glutathione peroxidase activity in rat tissues (Deistvie ioniziruiushchii radiatsii na gliutacion-peroksidaznuiu aktivnost' tkanei krysy). T. I. Gud'z', E. G. Peshkova, and E. N. Goncharenko (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Radiobiologiya*, vol. 22, July-Aug. 1982, p. 515, 516. 7 refs. In Russian.

**A82-45781 †** The radio protectiveness of cystamine injected intramuscularly in mice (Radiozashchitnaia effektivnost' tsistamina pri vnutrimyshechnom vvedenii mysham). P. Kuna (Purkyne Medical Research

Institute, Hradec Kralove, Czechoslovakia). *Radiobiologiya*, vol. 22, July-Aug. 1982, p. 517-519. In Russian.

**A82-45782 †** The metabolism of hydrocortisone in isolated livers of irradiated rats (Metabolizm gidrokortizona v izolirovannoi pecheni obluchennykh krysy). L. A. Litskevich and G. A. Dokshina (Tomskii Gosudarstvennyi Universitet, Tomsk, USSR). *Radiobiologiya*, vol. 22, July-Aug. 1982, p. 526-529. 10 refs. In Russian.

**A82-45783 †** The radiation sensitivity of animals exposed to a modified gas environment. IV - A comparative study of the effect of the respiration of pure oxygen at normal pressures on the proliferating activity of hemopoietic tissues and epithelial cells of the small intestine (Radiochuvstvitel'nost' organizma pri oblucheni zhivotnykh v izmenennoi gazovoi srede. IV - Sravnitel'noe izuchenie vlianiia dykhaniiia chistym kislorodom pri normal'nom davlenii na proliferativnuiu aktivnost' krovetvornoi tkani i epiteliial'nykh kletok tonkogo kishechnika). M. V. Vasin, T. S. L'vova, and L. V. Koroleva. *Radiobiologiya*, vol. 22, July-Aug. 1982, p. 539-542. 13 refs. In Russian.

**A82-45784 †** The modification of radiation damage by dibasic sulfur-containing phenol acids (Modifikatsiia radiatsionnogo porazheniia dvukhosnovnymi serosoderzhashchimi kislotami fenol'nogo riada). A. F. Kozhokaru, L. V. Alekseeva, and I. G. Akoev (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Radiobiologiya*, vol. 22, July-Aug. 1982, p. 545-548. 9 refs. In Russian.

The radiation protective effects of diphenylsulfide, diphenylsulfoxide, and diphenylsulfone derivatives were investigated in mice and rats after single exposures to gamma rays. The animals were injected with 0.2 ml of 0.01 M solutions of the sulfur-containing phenol acid derivatives at 1 and 5 hr before irradiation with 7.5-8.0 gram roentgens for mice and 9 gram roentgens for rats at a dose rate of 5.09 gram roentgens/min. Results show that compounds containing Cl, Br, OH, and NO<sub>2</sub> increased the survival rate of the animals to 90-100% after 30 days following exposure to radiation. N.B.

**A82-45785 †** The role of endogenous substances in creating a background of enhanced resistance to radioactivity. XIII - The effect of various radiation protective agents on lipid peroxidation (Rol' endogennykh veshchestv v sozdani fona povyshennoi radiorezistentnosti. XIII - Vlianie nekotorykh radioprotektorov na perekisnoe okislenie lipidov). A. V. Gurovich, A. G. Platonov, L. I. Deev, and Iu. B. Kudriashov (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Radiobiologiya*, vol. 22, July-Aug. 1982, p. 548-551. 16 refs. In Russian.

**A82-45786 †** The increase in the endurance for static loads in irradiated rats treated with gas hypoxic mixture /GHH-10/, an anti-irradiation agent (Povyshenie vynoslivosti k staticheskoii nagruzke u krysy, obluchennykh v usloviakh protivoluchevoi zashchity s pomoshch'iu GGS-10). R. B. Strelkov, N. G. Kucherenko, and V. A. Sholokhov (Akademiia Meditsinskikh Nauk SSSR, Obninsk, USSR). *Radiobiologiya*, vol. 22, July-Aug. 1982, p. 551-553. In Russian.

The resistance to static muscular loads is studied in Wistar rats weighing 170-180 g after exposure to radiation at 5.5 gram roentgens. Results showed an increase in the time the rats could be kept on a vertical stick for those animals that had breathed the gas hypoxic mixture (GHH-10) during irradiation. It is concluded that the induction of hypoxia during irradiation evokes a radiation protective effect in Wistar rats. N.B.

**A82-46182** Organo-siliceous biomolecules and the infrared spectrum of the Trapezium nebula. F. Hoyle, N. C. Wickramasinghe, and S. Al-Mufti (University College, Cardiff, Wales). *Astrophysics and Space Science*, vol. 86, no. 1, Aug. 1982, p. 63-69. 9 refs.

A close correspondence exists between the infrared properties of a mixed culture of diatoms and the infrared spectrum of dust in the Trapezium nebula. It is argued that this correspondence points to a cosmic microbiological system in which organo-siliceous polymers are an abundant constituent. The high content of Si relative to Mg found in the earth's crust and in lunar and Martian surface material is readily explained on the basis of accretion of silicon-rich microbiology. (Author)

**A82-46200** Toxicity of carbon monoxide, hydrogen cyanide and low oxygen. M. Matijak-Schaper and Y. Alarie (Pittsburgh, University, Pittsburgh, PA). *Journal of Combustion Toxicology*, vol. 9, Feb. 1982, p. 21-61. 20 refs.

A series of experiments were performed in mice to evaluate the toxicity of carbon monoxide, hydrogen cyanide and low oxygen atmospheres. Simultaneous monitoring of respiratory rate, respiratory pattern, escape activity and signs of asphyxiation permitted a more complete evaluation of their toxic effects than previously presented. (Author)

**A82-46251 \* Symposium on Aviation Psychology, 1st, Ohio State University, Columbus, OH, April 21, 22, 1981, Proceedings.** Symposium sponsored by NASA, Association of Aviation Psychologists, and Battelle Memorial Institute. Columbus, OH, Ohio State University, 1981. 416 p. \$10.00.

The impact of modern technology on the role, responsibility, authority, and performance of human operators in modern aircraft and ATC systems was examined in terms of principles defined by Paul Fitts. Research into human factors in aircraft operations and the use of human factors engineering for aircraft safety improvements were discussed, and features of the man-machine interface in computerized cockpit warning systems are examined. The design and operational features of computerized avionics displays and HUDs are described, along with results of investigations into pilot decision-making behavior, aircrew procedural compliance, and aircrew judgment training programs. Experiments in vision and visual perception are detailed, as are behavioral studies of crew workload, coordination, and complement. The effectiveness of pilot selection, screening, and training techniques are assessed, as are methods for evaluating pilot performance. M.S.K.

**A82-46252 \* # The role of communications, socio-psychological, and personality factors in the maintenance of crew coordination.** H. C. Foushee (NASA, Ames Research Center, Moffett Field, CA). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 1-11. 5 refs.

The influence of group dynamics on the capability of aircraft crew members to make full use of the resources available on the flight deck in order to maintain flight safety is discussed. Instances of crewmembers withholding altimeter or heading information from the captain are cited as examples of domineering attitudes from command pilots and overconscientiousness on the parts of copilots, who may refuse to relay information forcefully enough or to take control of the aircraft in the case of pilot incapacitation. NASA studies of crew performance in controlled, simulator settings, concentrating on communication, decision making, crew interaction, and integration showed that efficient communication reduced errors. Acknowledgements served to encourage correct communication. The best crew performance is suggested to occur with personnel who are capable of both goal and group orientation. Finally, one bad effect of computer controlled flight is cited to be the tendency of the flight crew to think that someone else is taking care of difficulties in threatening situations. M.S.K.

**A82-46253 # Human factors and aviation safety - A program of research on human factors in aviation.** S. N. Roscoe (New Mexico State University, Las Cruces, NM). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 21-27.

The use of statistical methods for human factors engineering in aviation system design are discussed. Designers of systems are noted to require information on display dimensions and sensitivity, sensing direction, visibility, access distance, combinations of indicators within a display, the feel of the controls, coding and functions of control apparatus, grouping of functionally related operations, and logic and coding of caution and warning indications. A horizontal program of research is recommended as a means to establishing a data base of human engineering principles applicable to a broad range of apparatus design goals. It is noted that the costs of producing total flight fidelity in a simulator would increase the price of simulators beyond the cost of the flight time potentially saved by use of a simulator. The successful operation of multifactor transfer experiments for choosing among the design variables for a simulator is noted. M.S.K.

**A82-46256 # Assessing emergency interface design.** W. C. Allen (Stanford University, Stanford, CA). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 51-60.

The fundamental principles of a human operator response macro level schema theory are reviewed, examined as to actual applicability to describing human response, and applied to an analytical approach to interface design. Schema theory is based on the existence of semantic knowledge, episodic memory structures, and two levels of selection optimization. The levels comprise an assessment of relative costs of delays, potential perception errors, and the costs of validating and determining the uniqueness of apparently valid schema. A reasonably valid schema is assumed to be operative in humans for producing an adequate fit for sensory data. A branch and bound approach to schema optimization is detailed and expressed in algorithm form. The addition of a modified decision analysis approach for interface design assessment is outlined and applied to developing a decision tree for an inferential decision model. M.S.K.

**A82-46257 # Ergonomic aspects in cockpit lay-out.** H. Aubauer and W. Sperr (Wien, Universität; Austrian Flight Safety Board, Vienna, Austria). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 63-73. 8 refs.

Problem areas in the human factors engineering approach to cockpit display

and controls design are outlined. Ergonomics begins with an analysis of the design space and location, assuming a 28-30 in. viewing distance for the main flight instruments panel. Operating procedures and the distribution of tasks are considered, along with viewing angles and the direction from which switches or controls will be handled. Provisions such as hand rests are necessary for stabilizing the pilot's hand when buttons must be pushed in turbulent conditions. Antireflective coatings are required for all glass surfaces, and upper case letters on annunciator displays have been shown to result in fewer errors. Toggle switch positions have been standardized for on and off designations, thereby lowering manufacturing and installation costs. Indicators and displays are chosen to move in the same direction, and it is noted that mirror image panel design leads to selection errors. M.S.K.

**A82-46258 \* # A comparison of tracking with visual and kinesthetic-tactile displays.** R. J. Jagacinski, J. M. Flach, and R. D. Gilson (Ohio State University, Columbus, OH). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 74-83. 9 refs. Army-USAF-sponsored research; Grant No. NSG-2179.

Recent research on manual tracking with a kinesthetic-tactile (KT) display suggests that under appropriate conditions it may be an effective means of providing visual workload relief. In order to better understand how KT tracking differs from visual tracking, both a critical tracking task and stationary single-axis tracking tasks were conducted with and without velocity quickening. On the critical tracking task, the visual displays were superior; however, the KT quickened display was approximately equal to the visual unquickened display. Mean squared error scores in the stationary tracking tasks for the visual and KT displays were approximately equal in the quickened conditions, and the describing functions were very similar. In the unquickened conditions, the visual display was superior. Subjects using the unquickened KT display exhibited a low frequency lead-lag that may be related to sensory adaptation. (Author)

**A82-46259 # General aviation cockpit design features related to inadvertent landing gear retraction accidents.** A. Diehl. In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 84-93. 6 refs.

A detailed review was made of all National Transportation Safety Board (NTSB) files of inadvertent landing gear retraction accidents occurring to general aviation aircraft in the U.S. from 1975 to 1978. The data indicated that two particular types of airplanes were involved in the majority of these accidents although they comprised only one-quarter of the active light aircraft with retractable landing gears. Pilot comments and human engineering evaluations of contemporary light aircraft cockpits revealed that these two particular aircraft types have four design features which should tend to increase the probability of inadvertent landing gear retraction accidents. (Author)

**A82-46260 \* # In-trail following during profile descents with a cockpit display of traffic information.** S. L. Chappell (Tufts University, Medford, MA) and E. A. Palmer (NASA, Ames Research Center, Moffett Field, CA). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 94-105. Grant No. NSG-2156.

Four line pilots performed simulator flights of 747s on different air routes in conditions of following other aircraft while maintaining a specified temporal flight interval separation. The flights were made in the heading-select mode of the autopilot, and the pitch wheel or altitude select/hold mode with the throttle on manual. A cockpit display of traffic information (CDTI) on a CRT was presented in front of the throttles. A VOR radial with dotted centerlines and sidebands representing 3 km intervals was displayed, along with scales of distance depending on altitude. Traffic information was updated every four seconds. Simulated flights began at cruise and followed a standard profile descent, and traffic following intervals of 60, 80, 120, and 140 seconds were presented in different trials. Results indicated that a CDTI was sufficient instrumentation for trailing other aircraft, with low error rates up to the point of landing preparations. M.S.K.

**A82-46261 # PAVE LOW III - Interior lighting reconfiguration for night lighting and night vision goggle compatibility.** H. L. Task and L. L. Griffin (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, OH). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 106-116.

The PAVE LOW III aircraft is a modified HH 53-H helicopter that has a low altitude (below 100 feet), night/day rescue mission. The desired night flying configuration is for the pilot to wear night vision goggles (NVGs) to fly the aircraft while the copilot, without NVGs, observes displays and monitors the aircraft instruments. The problems of NVG incompatibility in the cockpit were successfully countered using several light control techniques. The light control modifications were evaluated on the ground in the PAVE LOW III helicopter at Kirtland AFB in April 1980 by PAVE LOW instructor pilots. The evaluation results were extremely positive. (Author)

**A82-46262 \* # A study of decision-making behavior of aircraft pilots deviating from a planned flight.** G. W. Flather, II (Mitre Corp., McLean, VA), W. C. Giffin, and T. H. Rockwell (Ohio State University, Columbus, OH). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 120-133. 8 refs. Contract No. NAS2-10047.

This paper outlines an investigation into the worth structures of pilots facing a deviation from a planned flight. A 'paper and pencil' simulation was used to frame the situation into which pilots interjected their own decision making skills in a simple ranking of candidate diversion airports with varying locational, navigational aid, radar and weather attributes. Using the conjoint measurement technique, attribute worth functions of 30 pilots were constructed. It was discovered that systematic differences in the worth functions of the pilots did not occur as a result of dividing the pilot sample according to any measure of flight hour experience. However, differences were found when the pilot sample was grouped according to grade of pilot certificate, type of pilot training, and type of flying most commonly done. (Author)

**A82-46263 \* # An analysis of aircrew procedural compliance.** J. E. Schofield (U.S. Air Force Academy, Colorado Springs, CO) and W. C. Giffin (Ohio State University, Columbus, OH). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 134-144. Contract No. NAS2-10047.

This research examines the relationships between aircrew compliance with procedures and operator errors. The data for this analysis were generated by reexamination of a 1976 experiment in full mission simulation conducted by Dr. H. P. Ruffell Smith (1979) for the NASA-Ames Research Center. The character of individual operators, the chemistry of crew composition, and complex aspects of the operational environment affected procedural compliance by crew members. Associations between enumerated operator errors and several objective indicators of crew coordination were investigated. The correspondence among high operator error counts and infrequent compliance with specific crew coordination requirements was most notable when copilots were accountable for control of flight parameters. (Author)

**A82-46264 # Instructional design for aircrew judgment training.** F. Brecke (Logicon, Inc., San Diego, CA). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 145-160. 6 refs.

A conceptual framework for the concept of judgment is presented as a basis for its adaptation to pilot training design and research. Judgment is defined as a cognitive component which establishes alternative actions and factors for selection among them, and is an affective component which affects the choice among alternatives. A lack of total information is noted to be a fundamental criterion for situations requiring the use of judgment. The ability of a person to exercise correct judgment is bounded by the difficulty of the task, the repertoire of relevant cognitive strategies, the level of stress, and the available repertoire of stress coping mechanisms. Current U.S. Navy pilot training concentrates on procedures, and a method for systematically teaching judgment is described. It is recommended that elements of uncertainty be introduced as soon as proficiency is gained in flight skills. The use of programmed uncertainties in current F-14 and F-15 pilot training courses is outlined. M.S.K.

**A82-46265 # Landing airplanes, detecting traffic, and the dark focus.** S. N. Roscoe (New Mexico State University, Las Cruces, NM). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 172-181. 40 refs.

The results of a series of experiments dealing with the possibility of quantifying the degree of misperception a human subject, particularly a pilot, can expect when accommodating vision focus at a distance or in a dark empty visual field are discussed. It is noted that dark focus, the perception of object size in a dark visual field, is impeded by the ease of perception of nearby structures. Accurate use of dark focus is dependent on focusing beyond an object in order to more fully discriminate details of the object. Night flying induces empty field myopia, when the gradient field is interrupted, and pilots have been found to focus at the distance to window posts while trying to search the sky. However, if a city or landing field, full of night lights, is in visual range, the scene is perceived in a magnified manner. The possibility of conditioning the accommodation mechanisms through the use of biofeedback techniques is discussed. M.S.K.

**A82-46266 # The dark focus of accommodation and pilot performance.** R. A. Benel and T. L. Amerson, Jr. (Essex Corp., Alexandria, VA). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 182-191. 19 refs.

Two closely related lines of research are presented in this paper. The first follows directly from the work on the resting state of visual accommodation (dark focus) as a predictor of visual target acquisition and perceptual judgments. The second describes systematic (diurnal) variations in the dark focus. The possible relationship between this research and available performance (accident) data is

described. A discussion of the impact of this human capability factor upon function allocation in aviation systems is included with particular attention to selection criteria, training, and ameliorative (hardware) techniques. In addition, the relationship between the dark focus (as a preferred focal distance) and system monitoring is considered both for aircraft and for ground-based systems. (Author)

**A82-46267 # Functional optical invariants - A new methodology for aviation research.** R. Warren and D. H. Owen (Ohio State University, Columbus, OH). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 192-204. 7 refs. Grants No. AF-AFOSR-81-0078; No. AF-AFOSR-81-0108.

The application of Gibson's (1979) 'ecological approach to visual perception' to aviation psychology entails the use of information rich visual displays that must adequately and unambiguously enable a pilot to perform flight maneuvers. Optical information often takes the form of invariant properties of a changing optic array and functional invariants are defined as psychologically effective optical invariants. Their effectiveness is determined by empirical test but standard experimental paradigms are shown to be inappropriate for testing the effectiveness of information in rich displays due to the presence of inherent and unavoidable confounding factors that are here termed 'secondary independent variables' in contradistinction to the 'primary independent variables' manipulated by the experimenter. Recommendations for a new methodology and statistical treatment are offered and the implications for aviation psychology are discussed. (Author)

**A82-46268 # Fractional rates of change as functional optical invariants.** S. J. Mangold, D. H. Owen, and R. Warren (Ohio State University, Columbus, OH). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 205-215. 8 refs. Contract No. F49620-79-C-0070; Grant No. AF-AFOSR-81-0078.

The results of two experiments testing the requirements of use of higher order visual information to detect losses of altitude and decreases in forward velocity are reported. One experiment, using a simulator, involved measurements of descent rates in terms of eye heights to determine the global optical flow rate and the global flow deceleration. Subjects were exposed to 27 deceleration scenes comprising expanding objects of different colors. Data on reaction times relative to height, optical flow rate, proportion errors, and forward velocities were analyzed by an eta-squared method. Sensitivity to decrease in forward speed was determined to be linked to optical flow damping. Loss of altitude trials tested whether a visual scene showed level flight or descent. Decreased optical density occurs with decreased altitude, simultaneously with an increased optical flow rate. The methods described are concluded to indicate that experimental examinations of visual information for guiding self motion are possible. M.S.K.

**A82-46269 # An organization development approach to resource management in the cockpit.** L. O. Rings (Ohio State University, Columbus, OH). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 248-253.

The usefulness of applying an organization development (OD) model for cockpit resource management in general aviation aircraft is described. OD presents an integrated approach which utilizes the full flight crew. Pinch-hitter courses are noted, such as training passengers in the right seat how to land should the pilot become incapacitated. Airlines may have copilots or instructor pilots in the right seat who are motivated to upgrade to the left seat, thereby causing potential crew conflicts. A diagnostic approach to resource management is presented. Resources are classed at task, technology, structure, and people, with structure being the communication and authority framework. The people factor is discussed, and an exchange of information relating the degree of competency of the left and right seat flyers is recommended. Methods of determining the utility of the four variables are examined. M.S.K.

**A82-46270 # Validation of a proposed pilot trainee selection system.** J. M. Koonce (U.S. Air Force Academy, Colorado Springs, CO). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 255-260.

The efficiency and accuracy of the ground-based screening process for identifying successful pilot candidates at the U.S. Air Force Academy was examined. Candidates for pilot school took the Air Force Officer Qualifying Test (AFOQT) and aircrew psychomotor test (APT), were ranked for performance, and all were sent through pilot school. The APT measured eye-hand and foot-pedal coordination in visual tracking tasks, while the AFOQTs were written tests. All candidates for both tests were randomly chosen from Academy students. The distribution of scores from both tests were found to be similar for all pilots who successfully completed the pilot course, and neither test was successful at predicting success or failure of pilot candidates. M.S.K.

**A82-46271 # Sex as a moderator variable in the selection and training of persons for a skilled task.** T. M. McCloy and J. M. Koonce (U.S. Air Force

Academy, Colorado Springs, CO). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 261-266.

Results of a series of tests determining the effects of gender on cognitive and psychomotor skills, on the ability of tests designed for males to predict female success at the same skills, and the ability of females to transfer training skill to other complex tasks are presented. Subjects in the tests were 52 each of male and female freshman cadets at the U.S.A.F. Academy. Four cognitive tests, comprising identical pictures, map memory, cube comparison, and maze tracing tests, in addition to an embedded figures test, were given, along with a pursuit rotor test. Females excelled at the identical pictures test, and performed as well as the males on the other tests. The scores were employed to predict performance in flight maneuvers in smooth and rough air and overall. Follow-up tests were performed a year later, requiring verbal responses to flight situations and actual throttle and handling. A third test of remaining candidates measured performance of a chandelle flight maneuver. It was found that the regression equations used as predictors for one test were not necessarily satisfactory in predicting the performance of the other sex. M.S.K.

**A82-46272 # Changes in the US Army aviator selection and training program.** W. R. Brown, J. A. Dohme, and M. G. Sanders (U.S. Army, Research Institute, Fort Rucker, AL). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 267-278.

Features of the U.S. Army screening programs for predicting the performance of commissioned officers (CO) and warrant officers (WO) in rotary wing flight school are discussed. A Flight Aptitude Selection Test for both CO and WO candidates tests biographical data and interest information, spatial ability, mechanical ability, and aviation information levels. Revisions were added to the test to account for nap-of-the-earth flying techniques and the presence of female pilot candidates. Additionally, a retest form has been implemented, and it is noted that 25% of aviator candidates earn Aeroscout wings, while a majority of the candidates qualify for utility aviator status in the UH-1 helicopter. M.S.K.

**A82-46273 # Individual differences in multi-task response strategies.** D. Damos and T. Smist (New York, State University, Buffalo, NY). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 279-288.

This paper presents the results of two experiments examining individual differences in multiple-task performance. In the first experiment, the subjects were classified according to the response strategy they used to perform two discrete tasks. The subjects then performed three different task combinations on four successive days. A multivariate analysis of variance revealed significant between-strategy group differences in multiple-, but not single-, task performance. The second experiment was designed to determine if the results of the first experiment reflected between-group differences in information processing. The analyses indicated that one strategy group processed multiple-task information significantly more poorly than the other two groups. (Author)

**A82-46274 # Simulation technology and the fixation phase.** E. A. Stark (Singer Co., Link Flight Simulation Div., Binghamton, NY). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 289-305.

Prospects and techniques for using the fixation phase of human learning to teach specific flying skills without total fidelity, high cost simulators are explored. The fixation phase is defined as a period of simple skill acquisition, where a single pilot skill can be learned, in response to very specific stimuli, and later transferred to the real flying situations during the automation phase of learning, when skills become integrated as part of general knowledge and behavior. Examples of isolation of individual situations requiring very specific responses are provided, including flying a loop, rapid deceleration of a helicopter, and a high speed yo-yo. All are discussed in terms of procedural, perceptual, and perceptual motor functions, anticipation, and judgment components. Continued analyses of complex flight tasks to define important subtasks are indicated. M.S.K.

**A82-46275 # An adaptive private pilot certification exam.** S. R. Trollip and R. I. Anderson (Illinois, University, Urbana, IL). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 306-315. 5 refs.

An adaptive test is defined as one that is constructed dynamically on the basis of an examinee's responses. Many of the items to be administered are not selected beforehand; instead, they are selected as the test proceeds in such a way as to extract the most information from the test. The test thus adapts to the examinee. It is pointed out that in item response theory, item and test statistics are not dependent upon the particular group of examinees who responded to the test; the statistical values are constant for all groups of examinees. Item response theory therefore makes it possible to describe very precisely the characteristics of an item or test before it is administered. The way in which these testing techniques can be applied to private pilot certification is discussed. C.R.

**A82-46276 # Towards an internal model in pilot training.** R. J. Braune and S. R. Trollip (Illinois, University, Urbana, IL). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 316-325. 44 refs.

It is pointed out that research regarding the problems of pilot training has been dominated for a long time by suggestions coming out of behavioristically oriented success. Current findings in cognitive psychology and human information processing together with the changing role of the pilot seem to suggest that a new approach to flight training would be justified. Instrument flight training is one of the areas in which the behavioristic approach did not lead to the desired result. According to this approach, the pilot is supposed to develop a rigid scan pattern in examining the flight instruments. However, empirical evidence suggests that experienced instrument pilots adjust their scan pattern to the requirements of a given situation. In connection with this evidence an internal model of human observers was developed. Attention is given to questions which may serve as guidelines for research into the development of efficient training methods towards an accurate internal model. G.R.

**A82-46277 # Development and application of air combat performance assessment methods.** A. P. Ciavarella, A. M. Williams, and C. A. Britton (Dunlap and Associates, Inc., La Jolla, CA). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 362-375. 11 refs. Contracts No. N61339-77-C-0167; No. N61339-78-C-0136.

The Navy's Tactical Aircrew Combat Training System (TACTS) provides the sophisticated instrumentation required to obtain in-flight measures of air combat maneuvering (ACM) performance. Empirically based performance assessment methods have been derived using measures from TACTS. Results of this research have been used to develop a measurement framework which may be appropriately applied to estimate overall air combat training effectiveness as well as to provide diagnostic performance analysis of air combat tasks. Clearly, the availability of such objective performance data provides unique opportunities for research validation in the aviation psychology field. In addition, performance assessment methods thus far developed have been incorporated in an automated measurement system called the Performance Assessment and Appraisal System (PAAS). PAAS provides performance based training feedback to operational aircrews in the form of computer generated graphics. (Author)

**A82-46278 # Measures of effectiveness in evaluating a prototype general aviation in-flight simulator.** B. Strauch (Embry-Riddle Aeronautical University, Daytona Beach, FL). In: Symposium on Aviation Psychology, 1st, Columbus, OH, April 21, 22, 1981, Proceedings. Columbus, OH, Ohio State University, 1981, p. 376-390. 11 refs.

Traditional measures of evaluating simulator effectiveness are reviewed in relation to the unique needs of general aviation flight simulation. Two measures, simulator-related motivation and safety effectiveness are suggested as methods of examining general aviation simulator effectiveness. Simulator-related motivation refers to the type and extent of motivation pilots have to use simulators in lieu of alternative methods of training, while safety effectiveness refers to the impact of simulator use on the safety of all airspace users. These measures are related to the evaluation of a prototype general aviation simulator, one that combines aspects of a desk-top flight trainer within a popular light general aviation aircraft. (Author)

**A82-46308 Altitude hypoxia and hypercapnic mixtures (Hypoxie d'altitude et mélanges hypercapniques).** H. Marotte and H. Vieillefond (Centre d'Essais en Vol, Brétigny-sur-Orge, Essonne, France). *Médecine Aéronautique et Spatiale*, vol. 21, 2nd Quarter, 1982, p. 83-85. In French.

Four human subjects breathed gaseous mixtures of air containing 0.5, 1, 2, or 4 percent CO<sub>2</sub> in a high altitude chamber simulating conditions at 2000-5000 m. Monitoring proceeded on arterial oxygen saturation, expiration composition, total lung volume, while psychomotor tasks were performed in terms of tracking a moving target and extinguishing random, colored lights at the periphery of the visual field. Multifactorial statistical analyses of variance were performed on the data. It was found that physiological and performance parameters varied little at 2000 m, while at 5000 m severe degradations occurred. Hyperventilation was demonstrated to maintain sufficient arterial O<sub>2</sub> saturation so that psychomotor performance was not impaired. It is concluded that hyperventilation of CO<sub>2</sub>-rich air may lessen the effects of altitude hypoxia, although the addition of other gaseous hypercapnic pollutants may aggravate the psychomotor degradation. M.S.K.

**A82-46309 The use of echocardiography for the evaluation of flight fitness of pilots with cardio-vascular anomalies in reference to four cases (Intérêt de l'échocardiographie pour l'appréciation de l'aptitude au vol chez les pilotes atteints d'anomalies cardio-vasculaires à propos de quatre cas).** D. Rosenthal, E. Lafontaine, J. Lavernhe, L. Boisante, and M. Legendre. *Médecine Aéronautique et Spatiale*, vol. 21, 2nd Quarter, 1982, p. 86-88. 6 refs. In French.

Methods of echocardiography coupled to numerical models for analysis of the

flight fitness of pilots with anomalous cardiac responses are demonstrated through four case histories. ECGs are noted to be employed for diagnosis, prognosis, in the M mode for determining the systolic ejection fraction, and two-dimensionally for tracing the anterior lower and septolateral cardiac behavior. An ellipsoidal biplanar model has been developed which shows a good correlation to the left ventricular volume. Case histories are cited for four middle aged pilots whose heart function characteristics had to be progressively assessed with more ECG techniques in order to support decisions, by the medical examiner, that licence renewal should be permitted. M.S.K.

**A82-46310 Laryngocoele and barotraumatism (Laryngocèle et barotraumatisme).** L. Soubeyrand (Hôpital d'Instruction des Armées Bégin, Saint-Mandé, Val-de-Marne, France), J. F. Gouteyron, P. Buffe (Hôpitaux des Armées, Paris, France), and H. Lienhart (Centre Principal d'Expertise Médicale du Personnel Navigant, Paris, France). *Médecine Aéronautique et Spatiale*, vol. 21, 2nd Quarter, 1982, p. 89-92. 7 refs. In French.

Radiotherapy, chemotherapy, and surgical treatment for a laryngocoele occurring in a latero-cervical location in a military pilot's throat is described. Initial treatment with medication reduced swelling in the tumor, but failure of the node to disappear completely, coupled to the onset of coughing with prurient discharges after a return to flight duty, led to surgical removal. The tumor was determined to be benign and the pilot resumed solo flight duties after scar tissue had formed. An etiopathological explanation is offered in terms of lowered pressures at high altitudes causing an expansion of the laryngocoele to the point of rupture, which accounts for the prurient expectoration in accompanying coughing. It is recommended that fighter pilots be removed from flight duty until such tumors are removed, and that air carrier pilots be allowed to fly with two pilots on the flight deck until the growth is removed. Fighter pilots can return to duty after excision and radiotherapy. It is suggested that the condition is congenital, with good prognosis after surgery. M.S.K.

**A82-46311 A study of personal physiological protection equipment for a world record balloon ascent (Etude d'un équipement individuel de protection physiologique pour un record du monde d'ascension en montgolfière).** H. Marotte and H. Vieillefond (Centre d'Essais en Vol, Brétigny-sur-Orge, Essonne, France). *Médecine Aéronautique et Spatiale*, vol. 21, 2nd Quarter, 1982, p. 92-94. In French.

The design and equipment for a physiological protection system for a solo balloonist who set a new ascent record, 12,301 m, on July 18, 1980 is described. The equipment was configured on the basis of the flight plan, noting the decreasing ascent speed after 8000 m and the necessity for breathing apparatus after 11,800 m, where supplementary air is necessary to maintain alveolar oxygen pressure. A sealed pressure suit was selected in order to allow for tegumentary counter pressure for the head, trunk, and limbs. Pure oxygen was recommended in order to offset the chance of embolisms. The equipment comprised five liters of liquid O<sub>2</sub>, a converter for denitrogenation on the ground, an evaporator, a fast disconnect, a chest regulator, a pressurized helmet, the pressure suit, fire-proof Nomex undergarments, insulated underwear, a leather jacket, fur-lined boots, and electrically heated mittens. The record height was reached in 1 hr, 7 min. The quick disconnect, a reserve oxygen tank, and a parachute were carried for an emergency descent. M.S.K.

**A82-46312 The effect of morphological adaptation of personal flight equipment on the performance of oxygen systems (Rôle de l'adaptation morphologique des équipements personnels de vol sur le fonctionnement des systèmes oxygène).** H. Marotte, H. Vieillefond, and J. Dehayes (Centre d'Essais en Vol, Brétigny-sur-Orge, Essonne, France). *Médecine Aéronautique et Spatiale*, vol. 21, 2nd Quarter, 1982, p. 95-98. In French.

An examination of the ergonomic problems encountered in adapting personnel oxygen systems for different flight vehicles is presented, along with an analysis of probable hazards to flight safety caused by the changes. An example is explored in the case of equipment from the Concorde being modified and installed in a Mirage 2000. Labored breathing by an overweight pilot during a rapid ascent triggered operation of a modification in the overpressure governor, causing the pilot to perceive an oxygen shortage. The apparatus, set for low-altitude flight, was calibrated so that the regulator was providing for a cabin environment of 20,000 ft, while the aircraft had actually climbed to 40,000 ft. Replacing the regulator with one set for high-altitude flight corrected the hazard. However, it is recommended that the personal flight suits of pilots (particularly those who are overweight) also be adjusted for satisfactory performance. M.S.K.

**A82-46313 Performance degradation during 18 Hz vertical sinusoidal vibrations (Dégradation de performance sous vibrations sinusoidales verticales de 18 Hz).** J.-L. Poirier and C. Boutelier (Centre d'Essais en Vol, Brétigny-sur-Orge, Essonne, France). *Médecine Aéronautique et Spatiale*, vol. 21, 2nd Quarter, 1982, p. 101-104. In French.

The results of trials assessing the psychomotor performance of seated subjects experiencing 18 Hz sinusoidal vertical vibrations for 90 min at 0.1, 0.2 and 0.3 g are reported. The subjects were required to perform visual tracking tasks consisting of crossing two needles mounted on a gage one meter away and free from vibrations. The tests simulated conditions experienced with an ILS in a

helicopter. A secondary task comprised pressing a button to extinguish red and green lights which would appear for 3 sec on either side of the ILS mock-up. Control tests were also run for 90 min without the vibrations. The performance of the principal task degraded to a constant level, while an accelerated fatigue in terms of lengthening reaction times was seen for the secondary task during the 0.3 g trials. M.S.K.

**A82-46329 \* Dehydration-induced drinking in humans.** J. E. Greenleaf (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA). (American Physiological Society, Symposium on Dehydration-Induced Drinking: Peripheral and Central Aspects, Atlanta, GA, April 16, 1981.) *Federation Proceedings*, vol. 41, July 1982, p. 2509-2514. 22 refs.

The human tendency to experience a delay in rehydration (involuntary dehydration) after fluid loss is considered. The two primary factors contributing to involuntary dehydration are probably upright posture, and extracellular fluid and electrolyte loss by sweating from exercise and heat exposure. First, as the plasma sodium and osmotic concentrations remain virtually unchanged for supine to upright postural changes, the major stimuli for drinking appear to be associated with the hypovolemia and increase in the renin-angiotension system. Second, voluntary drinking during the heat experiments was 146% greater than in cool experiments; drinking increased by 109% with prior dehydration as opposed to normal hydration conditions; and drinking was increased by 41% after exercise as compared with the resting condition. Finally, it is concluded that the rate of sweating and the rate of voluntary fluid intake are highly correlated, and that the diagenic factors of plasma volume, osmolality, and plasma renin activity are unrelated to sweat rate, but are likely to induce drinking in humans. R.K.R.

**A82-46330 \* Origins of the protein synthesis cycle.** S. W. Fox (Miami University, Coral Gables, FL). *International Journal of Quantum Chemistry, Quantum Biology Symposium*, no. 8, 1981, p. 441-454. 79 refs. Grant No. NGR-10-007-008.

Largely derived from experiments in molecular evolution, a theory of protein synthesis cycles has been constructed. The sequence begins with ordered thermal proteins resulting from the self-sequencing of mixed amino acids. Ordered thermal proteins then aggregate to cell-like structures. When they contained proteinoids sufficiently rich in lysine, the structures were able to synthesize off-spring peptides. Since lysine-rich proteinoid (LRP) also catalyzes the polymerization of nucleoside triphosphate to polynucleotides, the same microspheres containing LRP could have synthesized both original cellular proteins and cellular nucleic acids. The LRP within protocells would have provided proximity advantageous for the origin and evolution of the genetic code. (Author)

**A82-46413 \* Prebiotic organic matter - Possible pathways for synthesis in a geological context.** S. Chang (NASA, Ames Research Center, Moffett Field, CA). (NATO, Advanced Study Institute on Early Evolution of the Planets and their Atmospheres, Newcastle-upon-Tyne, England, Mar. 23-Apr. 3, 1981.) *Physics of the Earth and Planetary Interiors*, vol. 29, Sept. 1982, p. 261-280. 127 refs.

Models for the accretion of the earth, core formation, differentiation of the planet into core, mantle, crust, and atmosphere, and prebiotic synthesis of organic materials are reviewed. The development of the Haldane-Oparin and Urey models is traced, and the effect of accretion time on the outgassing process and the composition of the consequent atmosphere is examined. Model prebiotic atmospheres are calculated, the extent of equilibration of the primitive atmosphere is studied and the evolution of the atmosphere prior to organic chemical evolution is reviewed. Finally, experimental progress in synthesis of biological monomers and polymers under presumed early earth conditions is covered. C.D.

**A82-46534 Sinusoidal and random whole-body vibration - Comparative effects on visual performance.** M. J. Moseley, C. H. Lewis, and M. J. Griffin (Southampton, University, Southampton, England). *Aviation, Space, and Environmental Medicine*, vol. 53, Oct. 1982, p. 1000-1005. 15 refs.

An experimental comparison of the effect of whole-body sinusoidal and one-third octave-band random vibration on the performance of a display reading task is described. The findings indicate that one-third octave-band random vibration has significantly less effect on performance. Subsequent measurements of rotational head motion demonstrated that this finding may be due to differences in the velocity probability density distributions produced by the different motions. Subjects also performed the visual task during exposure to several broad-band random motions. Predicted error values were obtained by averaging the frequency weighted time histories of these motions. It was found that both R.M.S. and R.M.Q. averaging procedures applied to the broad-band frequency weighted time histories gave accurate error predictions when compared with the measured error scores. Practical implications of the experimental findings and recommendations for future research are discussed. (Author)

**A82-46535 Automated visual field screening in the flying Dutch population.** J. T. W. Van Dalen (Nationaal Lucht- en Ruimtevaartgeneeskundig Centrum, Soesterberg, Netherlands). *Aviation, Space, and Environmental Medi-*

*cine*, vol. 53, Oct. 1982, p. 1006-1010. 12 refs.

Results of automated perimetry examinations of 1,000 subjects are presented. A Fieldmaster 200 was used, which consists of 133 holes placed at strategic locations in the visual field. The target illumination from a single central light source is provided by fiberoptic elements positioned behind each hole. The spots light up in a random sequence and the patient presses a button when a target is detected. A serious field defect was found for 17 subjects; 6 had glaucomatous changes in their visual fields, 3 subjects showed defects in the neuro-ophthalmological visual field, and 9 showed atypical defects, in particular, in the Bjerrum area and the peripheral field. Defects were found in almost 2% of the tested flying population of the Netherlands (the mean age of afflicted persons being 58.2). It is concluded that the Fieldmaster gives reliable results, and automated perimetry testing is strongly suggested, since the visual field is of importance. R.K.R.

**A82-46536 Aeromedical considerations of malaria prophylaxis with mefloquine hydrochloride.** J. R. Stockwell (USAF, School of Aerospace Medicine, Brooks AFB, TX). *Aviation, Space, and Environmental Medicine*, vol. 53, Oct. 1982, p. 1011-1013. 14 refs.

Mefloquine hydrochloride (WR 142,490) is a new investigational drug which is indicated for the prevention and treatment of chloroquine-resistant falciparum malaria thought to be resistant to other drugs. Available information on mefloquine, particularly its potential for 'quinine-like' side effects, is of aeromedical importance. These side effects, if present, would be expected to alter performance and body physiology to a degree which would comprise flight safety. There is legitimate concern for mefloquine's safe use in airmen. Mefloquine's potential for 'quinine-like' side effects should be evaluated before it is routinely used for suppressive prophylaxis in airmen. (Author)

**A82-46537 Serum ferritin increases during deep saturation dives.** S. C. Gilman (National Naval Medical Center, Naval Medical Research Institute, Bethesda, MD), R. J. Biersner (U.S. Navy, Naval Medical Research and Development Command, Bethesda, MD), and C. Piantadosi (U.S. Navy, Panama City, FL). *Aviation, Space, and Environmental Medicine*, vol. 53, Oct. 1982, p. 1014-1016. 11 refs. Navy-supported research.

Serum ferritin levels were determined in six U.S. Navy divers during a 29 d helium-oxygen saturation dive. Progressive increases in serum ferritin were observed during compression. These increases were maintained during decompression and for 1 week postdive. No relationship was found between serum ferritin increases and the development of decompression sickness (DCS). However, the two divers who subsequently developed DCS had significantly higher serum ferritin levels than those divers who remained free of DCS. These findings indicate that DCS does not result in differential serum ferritin variability and may, therefore, not be involved directly in aseptic bone necrosis (ABN) as postulated earlier by others. However, high baseline levels of serum ferritin may be involved in both DCS and ABN. (Author)

**A82-46538 Motivational analysis of human volunteers for centrifuge acceleration research.** J. E. Whinnery (USAF, School of Aerospace Medicine, Brooks AFB, TX). *Aviation, Space, and Environmental Medicine*, vol. 53, Oct. 1982, p. 1017-1020.

Motivational analysis of a representative group of individuals who volunteer to participate in centrifuge acceleration research at the USAF School of Aerospace Medicine was performed. Monetary reward and curiosity were the main reasons for volunteering to participate in the research program. Fear and monetary reward not worth the risk were the main reasons for not volunteering to participate. The major reason for stopping participation in the acceleration research program was not because of volunteer subject-related reasons, but because of being asked to stop for medical reasons by the medical members of the research staff. This type of periodic motivational analysis serves a number of constructive purposes, including self review of human-use research practices and volunteer subject feedback which enhance methods for recruitment and retention of high quality volunteer subjects. (Author)

**A82-46539 Sickle cell trait and aviation.** I. D. Long (Wright State University, Dayton, OH). *Aviation, Space, and Environmental Medicine*, vol. 53, Oct. 1982, p. 1021-1029. 37 refs.

The characteristics of the sickle cell trait are examined and the limitations placed on individuals affected by this trait are evaluated. It is found that sickle cell trait is a benign genetic abnormality which has been wrongly projected as a health hazard in aviation. Restrictions placed on sickle trait individuals unfairly stigmatize large numbers of people, both socially and economically. An analysis of the definitions of the hemoglobinopathies, the molecular basis of hemoglobin S, the interactions of abnormal hemoglobins, and the sickling phenomenon shows both that there is no evidence that the sickle trait is a health hazard and that most of the literature contrary to this finding is invalid. G.R.

**A82-46540 \* Synthesis of adriamycin-coupled polyglutaldehyde microspheres and evaluation of their cytostatic activity.** Z. A. Tokes, K. E. Rogers (Southern California, University, Los Angeles, CA), and A. Rembaum (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA). *National Academy of Sciences, Proceedings*, vol. 79, Mar. 1982, p. 2026-2030.

16 refs. Research supported by the Weingart Foundation and NASA.

Adriamycin was coupled to polyglutaldehyde microspheres having an average diameter of 4500 Å. The coupled microspheres remained stable during incubation with cells. Full cytostatic activity was observed when the coupled adriamycin was tested with murine or human leukemia and murine sarcoma cell lines. A 10-fold increase in sensitivity was obtained with drug-resistant human leukemia cell lines. Repeated use of the coupled microspheres in the cytostatic assays did not decrease their activity, indicating that these complexes can be recycled. The results suggest that coupled adriamycin sufficiently perturbs the plasma membrane to lead to cytostatic activity. It is proposed that this mode of drug delivery provides multiple and repetitious sites for drug-cell interactions. In addition, the drug-polymer complexes may overcome those forms of resistance that are the result of decreased drug binding at the cell surface. (Author)

**A82-46696 † Ways to increase the work capacity of persons subjected to prolonged sensory overloads (O putikh povyschenii rabotoposobnosti lits, podvergaiushchikhsia dlitel'nyim sensornym peregruzkam).** G. I. Alekseev, D. V. Gusarov, and Iu. A. Sobolin. *Voenno-Meditsinskii Zhurnal*, Aug. 1982, p. 38-40. 11 refs. In Russian.

A study was performed on 53 radar operators aged 20 to 30 in order to assess the effects of ammonia spirit on the human visual function in the case of visual fatigue. It is shown that the stimulation of the upper respiratory pathways by the inhalation of ammonia vapors is accompanied by a marked heightening of the tonus of cortical centers and of the nervous system as a whole. In particular, the effect of the ammonia spirit is manifested in an increase of the throughput of the visual analyzer and in a short-term increase of muscle activity. B.J.

**A82-46697 † Therapeutic-prophylactic measures in regard to eye diseases among flight personnel (Lechebno-profilakticheskie meropriiatiia pri zabolevaniakh organa zreniia u lits letnogo sostava).** L. M. Asyev. *Voenno-Meditsinskii Zhurnal*, Aug. 1982, p. 41, 42. In Russian.

Recommendations are made on the treatment and prophylaxis of chronic eye diseases among flight personnel. Two types of training are discussed in particular: training to strengthen the accommodation function of eyes with slight nearsightedness and accommodation disorders; and training to increase convergence stability. B.J.

**A82-46701 † In class, in the air, and in orbit (V klasse, vozdukhie i na orbite).** I. Iudin. *Aviatsiia i Kosmonavtika*, July 1982, p. 44, 45. In Russian.

The training of cosmonauts in a class devoted to the remote sensing of earth resources is described. Particular consideration is given to the preliminary training of cosmonauts in the discipline of remote sensing, the role of man in the sensing of earth resources from orbital space stations, and the role of automation. B.J.

**A82-46702 † Metabolism of the myocardium in the case of ischemia /Review of the literature/ (Metabolizm miokarda pri ishemii /Obzor literatury/).** A. I. Khomaziuk and L. N. Glebova (Ministerstvo Zdravookhraneniia Ukrainkoi SSR, Kievskii Nauchno-Issledovatel'skii Institut Endokrinologii i Obmena Veshchestv, Kiev, Ukrainian SSR). *Vrachebnoe Delo*, July 1982, p. 5-13. 63 refs. In Russian.

**A82-46703 † The ultrastructural bases of cardiac insufficiency (Ultrastrukturnye osnovy serdechnoi nedostatochnosti).** A. F. Kiseleva and L. A. Stechenko (Kievskii Meditsinskii Institut, Kiev, Ukrainian SSR). *Vrachebnoe Delo*, July 1982, p. 17-21. 10 refs. In Russian.

The ultrastructural bases of cardiac insufficiency were investigated in patients with cardiovascular diseases and by using models of these pathological processes. Results show that the stage of stable cardiac adaptation is characterized ultrastructurally in the myocardium by compensatory-adaptive processes that are expressed by the biogenesis and the hypertrophy of mitochondria and the contractile apparatus of cardiomyocytes. It is determined that chronic cardiac insufficiency is characterized by marked grades of dystrophic processes in the structure of cardiomyocytes and the connective tissues of the myocardium. N.B.

**A82-46704 † Immuno-enzymological comparisons in the differential diagnosis of various myocardial lesions (Imunoenzimologicheskie sopostavleniia v differentsial'noi diagnostike razlichnykh porazhenii miokarda).** A. G. Shvidkin (Kievskii Meditsinskii Institut, Kiev, Ukrainian SSR). *Vrachebnoe Delo*, July 1982, p. 28-32. 10 refs. In Russian.

**A82-46705 † The compensatory reactions following focal vascular lesions of the cerebral hemisphere as evaluated by electroencephalography (Kompensatornye reaktsii po dannym elektroentsefalografii posle ochagovykh sosudistykh porazhenii polusharii mozga).** N. B. Man'kovskii, R. P. Belong, V. G. Kostuchenko, and G. D. Tordii (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Vrachebnoe Delo*, July 1982, p. 39-42. 10 refs. In Russian.

**A82-46706** † Clinical-EEG comparisons during vegetative-vascular and visceral paroxysms (Kliniko-EEG sopostavleniia pri vegetativno-sosudistykh i vistseral'nykh paroksizmaykh). Iu. K. Lushchin (Kievskii Institut Usovershenstvovaniia Vrachey, Kiev, Ukrainian SSR). *Vrachebnoe Delo*, July 1982, p. 42-45. 12 refs. In Russian.

**A82-46707** † The mechanism of action of laser radiation on the somatic membranes of neurons (Mekhanizm deistviia lazernogo izlucheniia na somaticheskuiu membranu neuronov). A. O. Korkushko and E. L. Macheret (Kievskii Institut Usovershenstvovaniia Vrachey, Kiev, Ukrainian SSR). *Vrachebnoe Delo*, July 1982, p. 94-97. In Russian.

The mechanism of action of laser radiation in the ultraviolet and visible range on the somatic neuron membranes of rats is investigated. Results show that coherent irradiation at wavelengths of 266 and 337 nm is less effective for the photoinactivation of the sodium channels of the somatic neuron membranes than for the sodium channels of the myelinated nerve fibers. In addition, irradiation with visible light at a wavelength of 440 nm also led to the photoinactivation of the sodium channels of the somatic membranes, but at a lower rate than that caused by ultraviolet irradiation. N.B.

**A82-46708** † Toxicological characteristics of polychlorinated diphenyls /Review of the non-Soviet literature/ (Toksikologicheskaia kharakteristika polikhlorigovannykh difenilov /Obzor zarubezhnoi literatury/). G. V. Tolstoptatova and V. I. Korkach. *Vrachebnoe Delo*, July 1982, p. 101-106. 63 refs. In Russian.

**A82-46709** † The deterioration of the working efficiency of stereophotogrammetrists and their professional selection (O snizhenii proizvoditel'nosti truda stereofotogrammetristov i ikh profotbor). G. I. Osipov and Iu. Z. Rozenblium (Moskovskii Nauchno-Issledovatel'skii Institut Glaznykh Boleznei, Moscow, USSR). *Vestnik Oftal'mologii*, June-Aug. 1982, p. 68-71. 11 refs. In Russian.

Several visual functions were examined in a group of 325 stereophotogrammetrists working at topographic and geodesic institutions, and the basic visual characteristics of individuals with satisfactory and unsatisfactory work records were compared. Results show that the principal causes of the decline in the working efficiency were astigmatism, low fusion reserves, exophoria at short distances, and organic changes in the eyes. On the basis of these results, recommendations for the selection of stereophotogrammetrists are proposed. N.B.

**A82-46710** † Ultrasonic scanning in the diagnosis of retinoblastomas (Ul'trazvukovoe skanirovaniie v diagnostike retinoblastom). V. I. Timakova, F. E. Fridman, and A. V. Khvatova (Moskovskii Nauchno-Issledovatel'skii Institut Glaznykh Boleznei, Moscow, USSR). *Vestnik Oftal'mologii*, June-Aug. 1982, p. 71-73. In Russian.

**A82-46711** † Laser retinometry for cataracts (Lazernaia retinometriia pri pomutneniiakh khristalika). E. S. Avetisov, R. A. Gundorova, S. L. Shapovalov, V. N. Tarasenkova, E. Sh. Shapiro (Moskovskii Nauchno-Issledovatel'skii Institut Glaznykh Boleznei, Moscow, USSR); and D. G. Begishvili. *Vestnik Oftal'mologii*, June-Aug. 1982, p. 57-60. 17 refs. In Russian.

**A82-46712** † The significance of the changes in the chorioretinal structures for the mechanism of the therapeutic action of the argon laser /experimental study/ (Znachenie izmeneniia khorioretinal'nykh struktur v mekhanizme terapevticheskogo deistviia argonovogo lazera /Eksperimental'noe issledovanie/). G. G. Ziangirova, V. S. Akopian, Z. U. Akhmed'ianova, O. K. Pereverzina, and T. S. Il'ina (Ministerstvo Zdravookhraneniia SSSR, Vsesoiuznyi Nauchno-Issledovatel'skii Institut Glaznykh Boleznei, Moscow, USSR). *Vestnik Oftal'mologii*, June-Aug. 1982, p. 51-57. In Russian.

**A82-46713** † The age-related changes of biochemical and biomechanical parameters of human sclera in normal and myopic individuals (Vozrastnye izmeneniia biokhimicheskikh i biomekhanicheskikh pokazatelei skleri cheloveka v norme i pri miopii). N. F. Savitskaia, V. I. Vinetskaia, and E. N. Iordina (Moskovskii Nauchno-Issledovatel'skii Institut Glaznykh Boleznei, Moscow, USSR). *Vestnik Oftal'mologii*, June-Aug. 1982, p. 26-29. 15 refs. In Russian.

**A82-46714** † Immune complexes and atherosclerosis (Immunnye komplekсы i ateroskleroz). S. G. Osipov and V. N. Titov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kardiologiia*, vol. 22, July 1982, p. 119-125. 88 refs. In Russian.

Recent studies on mechanisms of immunopathology are reviewed. A hypothetical scheme is proposed which outlines the determining role of immune complexes in the pathogenesis of atherosclerosis. B.J.

**A82-46715** † A comparative evaluation of the structural features of the diurnal rhythms of the cardiovascular system in healthy individuals and

in patients with ischemic heart disease (Sravnitel'naia otsenka strukturykh osobennostei sutochnykh ritmov serdechno-sosudistoi sistemy u zdorovykh lits i bol'nykh ishemicheskoi bolezn'iu serdtsa). K. G. Adamian, N. L. Aslanian, and S. V. Grigorian (Ministerstvo Zdravookhraneniia Armianskoi SSR, Institut Kardiologii, Yerevan, Armenian SSR). *Kardiologiia*, vol. 22, July 1982, p. 80-84. 11 refs. In Russian.

**A82-46716** † Prevention of stress damage to the heart and its hypoxic contracture with the natural antioxidant alpha-tocopherol (Preduprezhdeniie stressornogo povrezhdeniia serdtsa i ego gipoksicheskoi kontraktury s pomoshch'iu estestvennogo antioksidanta alpha-tokoferola). F. Z. Meerson and E. E. Ustinova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kardiologiia*, vol. 22, July 1982, p. 89-94. 9 refs. In Russian.

Experiments on the isolated hearts of rats have shown that emotional and pain stress potentiates ischemic and hypoxic damage to the heart, as measured by the loss of the CPK enzyme by the myocardium and the degree of hypoxic contracture. It is shown that preliminary administration of alpha-tocopherol prevents contractility disorders of the heart induced by stress and the potentiating effect of stress on ischemic damage and the development of hypoxic contracture. Alpha-tocopherol also limits the damaging effect of hypoxia on the heart and that of reoxygenation. Results indicate the usefulness of alpha-tocopherol in the treatment of myocardial infarction. B.J.

**A82-46717** † The sympathico-adrenal and the hypophysial-adrenal systems in the pathogenesis of the post-ischemic syndrome (Simpatiko-adrenalovaia i gipofizarno-nadpochechnikovaia sistemy v patogeneze postishemicheskogo sindroma). N. A. Sergeeva, M. R. Isaev, L. D. Makarova, and T. V. Terekhova (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Kardiologiia*, vol. 22, July 1982, p. 75-80. 9 refs. In Russian.

**A82-46718** † The hypophysial-thyroid system in the course of a complicated and an uncomplicated myocardial infarction (Gipofizarno-tireoidnaia sistema v dinamike oslozhnennogo i neoslozhnennogo infarkta miokarda). M. S. Nabiulin and A. D. Kuimov (Novosibirskii Meditsinskii Institut, Novosibirsk, USSR). *Kardiologiia*, vol. 22, July 1982, p. 72-75. 20 refs. In Russian.

**A82-46719** † An analysis of the role of genetic and environmental factors in predicting the effectiveness of arterial hypertension treatments (Analiz roli geneticheskikh i sredovykh faktorov v prognozirovanii effektivnosti terapii arterial'noi gipertonii). V. I. Trubnikov, R. D. Zolotaia, R. M. Zaslavskaya, and E. T. Lil'in (Nauchno-Issledovatel'skii Institut po Biologicheskimi Ispytaniim Khimicheskikh Soedinenii, Moscow, USSR). *Kardiologiia*, vol. 22, July 1982, p. 63-68. 9 refs. In Russian.

Three predictors for the effectiveness of arterial hypertension treatments in acute clinical-pharmacological tests using preparations of anaprilin, hemiton, and dopegit were found using the method of canonical correlation. The systolic and diastolic arterial pressures, the heart rate at the time of the initial clinical examination, and also the height and weight of the patient were determined to be parameters for the effectiveness of treatment. An evaluation of the relative roles of genetic and environmental factors in predicting the effectiveness of a drug showed that genetic factors are the most useful in predicting the effectiveness of dopegit, and are the least useful for anaprilin. N.B.

**A82-46720** † The results of the exercise test and further outcomes in patients with chronic ischemic heart disease (Rezultaty testa s fizicheskoi nagruzko i otdalennye iskhody u bol'nykh khronicheskoi ishemicheskoi bolezn'iu serdtsa). L. A. Ivanova, N. A. Mazur, T. M. Smirnova, A. B. Sumarokov, E. A. Svet, and V. V. Kotliarov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kardiologiia*, vol. 22, July 1982, p. 52-57. 20 refs. In Russian.

The effectiveness of the bicycle ergometer as an exercise test for predicting the seriousness of ischemic heart disease was examined in 300 men following myocardial infarction. The method of consecutive risk stratification was used to assess the prognostic significance of various combinations of indices collected during the exercise tests. Persons with a high risk of death from ischemic heart disease, 28% of the total number of individuals examined, were identified on the basis of these indices and at the end of two years individuals in this group comprised 91% of all deaths from ischemic heart disease and 94% of cases of sudden deaths. The mortality in this group was found to be 25 times higher and the death frequency 45 times higher than for the other individuals examined. In addition, combinations of indices are also found for individuals having high risks of repeated nonfatal infarctions, as well as individuals with low risks of additional infarctions. N.B.

**A82-46721** † Characteristics of the blood rheology, platelet function, and hemodynamics in patients with ischemic heart disease during extended hypokinesia following amputations of the limbs (Osobennosti reologicheskikh svoistv krovi, funktsii trombotsitov i gemodinamiki u bol'nykh ishemicheskoi bolezn'iu serdtsa posle amputatsii konechnostei, nakhodiaschchikhsia v sostoianii dlitel'noi gipokinezii). V. A. Liusov, L. N. Kaznacheev, A. S. Parfenov, and A. V. Rudakov (Tsentral'nyi Nauchno-

Issledovatel'skii Institut Protezirovaniia i Protezostroeniia; II Moskovskii Meditsinskii Institut, Moscow, USSR). *Kardiologiya*, vol. 22, July 1982, p. 34-38. 16 refs. In Russian.

**A82-46722 †** Graded physical-exercise loads in the period right after myocardial infarction (Dozirovannye fizicheskie nagruzki v blizhaishem postinfarktnom periode). L. T. Aleinikova, G. P. Kolesova, and V. A. Cherniak (Odesskii Meditsinskii Institut, Odessa, Ukrainian SSR). *Kardiologiya*, vol. 22, July 1982, p. 31-34. 13 refs. In Russian.

**A82-46723 †** Isoenzymes following exercise in patients with ischemic heart disease (Izoenzimy posle fizicheskoi nagruzki u bol'nykh ishemicheskoi bolezn'iu serdtsa). W. Geissler, K. Kothe, P. Romaniuk, G. Gola, W. Porstmann, and C. Wagenknecht (Berlin, Humboldt-Universität, Berlin, East Germany). *Kardiologiya*, vol. 22, July 1982, p. 26-31. 26 refs. In Russian.

**A82-46724 †** The dynamics of several electrocardiographic, cardiodynamic, and biochemical parameters under the influence of intensive training on the bicycle ergometer in patients with angina pectoris (Dinamika nekotorykh elektrokardiograficheskikh, kardiogemodinamicheskikh i biokhimicheskikh pokazatelei pod vlianiem intensivnykh trenirovok na veloergometre u bol'nykh so stenokardiei). V. I. Kudinov, A. G. Ponomareva, T. I. Zavadskaia, and N. M. Dolzhenko (Rostovskii Meditsinskii Institut, Rostov-on-Don, USSR). *Kardiologiya*, vol. 22, July 1982, p. 21-25. 19 refs. In Russian.

**A82-46725 †** The reactions of the cat auditory cortex neurons to the electrical stimulation of nerve fibers which innervate the receptor cells of different parts of the organ of Corti in the cochlea (Reaktsii neuronov slukhovoï kory koshki na elektrostimulatsiiu nervnykh volokon, innerviruiushchikh retseptornye kletki raznykh otdelov kortievogo organa ulitki). I. O. Volkov (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Neirofiziologiya*, vol. 14, no. 4, 1982, p. 418-425. 30 refs. In Russian.

**A82-46851 †** The oxygen effect in E. coli cells. II - The role of the genotype and the suspension medium (Kislorodnyi effekt u kletok E. Coli. II - Rol' genotipa i suspenzionnoi sredy). M. N. Miasnik, V. G. Skvortsov, and V. A. Sokolov (Akademiia Meditsinskikh Nauk SSSR, Obninsk, USSR). *Radiobiologiya*, vol. 22, May-June 1982, p. 312-317. 27 refs. In Russian.

**A82-46852 †** The induced synthesis of tyrosine aminotransferase in the liver of irradiated rat embryos (Indutsirovannyi sintez tirozinamino-transferazy v pečeni embrionov krysy pri radiatsionnom). L. V. Slozhenikina, L. A. Fialkovskaia, and A. M. Kuzin (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Radiobiologiya*, vol. 22, May-June 1982, p. 383-386. 12 refs. In Russian.

**A82-46853 †** The dynamics of the amount and several aspects of the exchange of nicotinamide coenzymes in irradiated organisms (Dinamika soderzhanii i nekotorye storony obmena nikotinamidnykh kofermentov v obluchennom organizme). I. V. Savitskii and A. G. Solynina (Odesskii Meditsinskii Institut, Odessa, Ukrainian SSR). *Radiobiologiya*, vol. 22, May-June 1982, p. 386-390. 11 refs. In Russian.

The amount, the intracellular distribution, and the metabolism of nicotinamide coenzymes were investigated in the livers of rats which had been exposed to sublethal doses of ionizing radiation. Results show that ionizing radiation evokes a decrease in the amount of NAD(+) and NADH in the subcellular (nuclear, mitochondrial, and cytoplasmic-microsomal) fractions of rat livers, and this decrease is found to be most pronounced on the 3rd and 7th day following irradiation. Under similar conditions, the activity of NAD-glycohydrolase is found to increase. It is concluded that the activation of NAD-glycohydrolase as a means of degrading NAD is one of the links of the molecular mechanism of decreasing the level of NAD in irradiated organisms. N.B.

**A82-46854 †** The effect of a dysentery divaccine as a therapeutic agent for experimental radiation sickness on the immune response to a heterologous antigen (Vlianie primeneniia dizenterinoi divaktsiny v kachestve lechebnogo sredstva pri eksperimental'noi luchevoi bolezni na immunnyi otvet k geterologichnomu antigenu). E. A. Tiurin. *Radiobiologiya*, vol. 22, May-June 1982, p. 395-398. 10 refs. In Russian.

**A82-46855 †** Models for the recovery of cells from radiation damage and the principle of the diminution of the effective dose. II - A model of the recovery of cells under arbitrary conditions of irradiation (Modelirovanie protsessov vosstanovleniia kletok ot luchevykh povrezhdenii i printsip umen'sheniia effektivnoi dozy. II - Model' vosstanovleniia kletok pri proizvol'nykh usloviakh oblucheniia). A. D. Andreev (Akademiia Nauk Ukrainskoi

SSR, Institut Fiziologii Rastenii, Kiev, Ukrainian SSR). *Radiobiologiya*, vol. 22, May-June 1982, p. 399-402. 6 refs. In Russian.

**A82-46856 †** Chromosome aberrations in myelocaryocytes caused by the chronic action of tritium oxide at various dose rates (Aberatsii khromosom v mielokariotsitakh pri khronicheskom deistvii okisi tritiia s raznoi moshchnost'iu dozy). T. I. Uriadnitskaia and K. N. Muksinova. *Radiobiologiya*, vol. 22, May-June 1982, p. 403-406. 10 refs. In Russian.

**A82-46857 †** The nonadditive effects of neutron and gamma radiation on Ehrlich ascites tumor cells (O neadditivnosti effektov neitronnogo i gamma-oblucheniia kletok astsitnoi kartsinomy Erlikha). L. N. Postnikov, A. G. Silina, and A. G. Sverdlov (Akademiia Nauk SSSR, Institut Iadernoi Fiziki, Leningrad, USSR). *Radiobiologiya*, vol. 22, May-June 1982, p. 406-409. 9 refs. In Russian.

**A82-46858 †** The condition of the endocrine system of the progeny of female rats treated with selenium-75 selenomethionine (Sostoianie endokrinnoi sistemy u potomstva samok krysa, poluchivshikh 75Se-selenomethionin). V. I. Dedov and T. A. Norets (Akademiia Meditsinskikh Nauk SSSR, Obninsk, USSR). *Radiobiologiya*, vol. 22, May-June 1982, p. 409-412. In Russian.

**A82-46859 †** The induction of tumors in the brain of rabbits by chronic local irradiation from implanted radioactive sources (Indutsirovanie opukhoklei v golovnom mozge krolikov pri khronicheskom lokal'nom obluchanii implantirovannyimi radioistochnikami). M. M. Sataev and N. K. Muratkhodzaev (Ministerstvo Zdravookhraneniia Uzbekskoi SSR, Uzbekskii Nauchno-Issledovatel'skii Institut Onkologii i Radiologii, Tashkent, Uzbek SSR). *Radiobiologiya*, vol. 22, May-June 1982, p. 412-415. 13 refs. In Russian.

**A82-46860 †** Delayed radiation pathology after irradiation of the rat abdomen (Otdalennaiia luchevaia patologiya pri obluchanii oblasti zhivota krysa). V. D. Kudriavtsev, R. A. Brodskii, L. N. Bandurko, and L. I. Filatova (Akademiia Meditsinskikh Nauk SSR, Obninsk, USSR). *Radiobiologiya*, vol. 22, May-June 1982, p. 416-419. 10 refs. In Russian.

The organs and systems which play a leading role in the delayed development of radiation pathology after irradiation in doses evoking the intestinal syndrome are investigated by studying the life-span of rats, the conditions of their small intestine, kidneys, pancreas, liver, and spleen, and their hemopoiesis at delayed intervals following partial irradiation of the animals in doses of 14 gram roentgens. Results show that the shortening of the life-span of the irradiated rats is mainly due to the impairment of the structure and function of the kidneys. In addition, dystrophic and sclerotic processes in the liver and pancreas also contribute to the development of delayed radiation pathology following irradiation in lethal doses. N.B.

**A82-46861 †** The effect of gamma irradiation on the survival rate of *Artemia salina* L./ (Vlianie gamma oblucheniia na vyzhivaemost' *Artemia salina* L.). L. A. Radchenko (Akademiia Nauk SSSR, Institut Biologii luzhnykh Morei, Sevastopol, USSR). *Radiobiologiya*, vol. 22, May-June 1982, p. 423-426. 7 refs. In Russian.

The effect of varying sublethal doses of gamma irradiation (2.5, 3, 7.5, and 10 gram roentgen) on the survival rate and on the survival at different stages of development of *Artemia salina* (L.) is studied in environments with a salt content of 18‰ (sea water) and median temperatures of 15, 22, 25, and 27 °C. Results show that the effects of radiation depend on the temperature comfortable for the development of *Artemia salina* (L.). It is concluded that radiation doses of up to 5 gram roentgens can be considered low doses for *Artemia salina* (L.). N.B.

**A82-46862 †** The microdosimetric characteristics of sources of monoenergetic neutrons (Mikrodozimetricheskie kharakteristiki istochnikov monoenergeticheskikh neitronov). V. V. Farnakeev, V. G. Videnskii, and A. G. Kolpachev (Akademiia Meditsinskikh Nauk SSSR, Obninsk, USSR). *Radiobiologiya*, vol. 22, May-June 1982, p. 427-429. 13 refs. In Russian.

The use of monoenergetic neutron sources in radiobiological studies on the cellular and subcellular levels is considered. A spherical proportional tissue-equivalent counter was used to measure the distribution functions of absorbed energy upon exposure of a spherical tissue-equivalent volume 1.0 micron in diameter to monoenergetic neutrons in the 0.35-6.1 MeV range. B.J.

**A82-46863 †** Several new features of the comparison of cell survival dose parameters /statistical analysis and extrapolation number modification factor/ (Nekotorye novye aspekty sopostavleniia parametrov dozovykh krivyykh vyzhivaemosti kletok /statisticheskii analiz, faktor izmeneniia ekstrapoliatsionnogo chisla/). V. I. Kulinskii (Ministerstvo Zdravookhraneniia RSFSR, Krasnoarskii Gosudarstvennyi Meditsinskii Institut, Krasnoyarsk, USSR). *Radiobiologiya*, vol. 22, May-June 1982, p. 323-328. 16 refs. In Russian.

**A82-46864 †** Different modifiability of point and structural radiation mutations in eukaryotes (O razlichnoi modifikatsionnosti vykhoda tochkovykh i strukturnykh radiatsionnykh mutatsii u eukariot). I. B. Mosse (Akademiia Nauk Belorusskoi SSR, Institut Genetiki i Tsitologii, Minsk, Belorussian SSR). *Radiobiologiya*, vol. 22, May-June 1982, p. 329-334. 27 refs. In Russian.

The causes of the differential modifiability of point and structural radiation mutations by oxygen, nitrogen, and conventional radioprotective agents are examined. In addition, the different yields of these types of mutations as induced by irradiation at different stages of gametogenesis are evaluated. An explanation is proposed to account for the observed differences which stresses the differential reparability of point and structural mutations in eukaryotes. It is concluded that point mutations are formed at shorter intervals of time and to a lesser extent depend on the various intracellular processes, than do chromosomal alterations. For alterations of the chromosomes, the chromosomal proteins play an essential role in their modifiability. N.B.

**A82-46865 †** The recovery of mouse hemopoiesis at long intervals following extended external /Cs-137/ and internal /H-3/ irradiation (Vostanovlenie krovetvorenii u myshei v pozdnie sroki posle dlitelnogo vneshnego /Cs-137/ i vnutrennego /H-3/ obлучeniia). V. M. Luzanov, L. D. Murzina, and E. N. Kirillova. *Radiobiologiya*, vol. 22, May-June 1982, p. 335-340. 12 refs. In Russian.

**A82-46866 †** The determination of the number of stem cells by the number of colonies of undifferentiated cells in the bone marrow of irradiated animals (Opredelenie chisla stvolovykh kletok po chislu kolonii nedifferentsirovannykh kletok v kostnom mozge obлучennykh zhivotnykh). E. N. Shcherbova and G. P. Gruzdev. *Radiobiologiya*, vol. 22, May-June 1982, p. 346-351. 15 refs. In Russian.

A method is developed for determining the number of hemopoietic cells in various mammals according to the number of undifferentiated cell colonies which are formed in the bone marrow 3-4 days following irradiation. A quantitative identity of undifferentiated cell colonies and stem hemopoietic cells were found in mice, and their identical reaction to radiation was demonstrated by determining the number of undifferentiated cell colonies in histological preparations of bone marrow and by the method of exocolonies and endocolonies in the spleen (the Till and McCulloch /1961/ method). A method is developed for the determination and the calculation of the number of undifferentiated cell colonies in bone marrow. N.B.

**A82-46867 †** The molecular mechanisms of the interphase death of lymphoid cells. V - Determination of the lifespan of nuclear and polysomal RNA in irradiated thymocytes (Molekuliarnye mekhanizmy interfaznoi gibeli limfoidnykh kletok. V - Opredelenie vremeni zhizni iadernykh i polisomnykh RNK v obлучennykh timotsitakh). B. D. Zhiotovskii, G. V. Voskoboinikov, and K. P. Khanson (Ministerstvo Zdravookhraneniia SSSR, Tsentral'nyi Nauchno-Issledovatel'skii Rentgeno-Radiologicheskii Institut, Leningrad, USSR). *Radiobiologiya*, vol. 22, May-June 1982, p. 352-358. 31 refs. In Russian.

**A82-46868 †** The cellular composition of lymphoid organs and the parameters of the immune response of mice at later times following irradiation (Kletochnyi sostav limfoidnykh organov i parametry immunnogo otveta myshei v pozdnie sroki posle obлучeniia). M. P. Samoilovich and V. B. Klimovich (Ministerstvo Zdravookhraneniia SSSR, Tsentral'nyi Nauchno-Issledovatel'skii Rentgeno-Radiologicheskii Institut, Leningrad, USSR). *Radiobiologiya*, vol. 22, May-June 1982, p. 359-364. 12 refs. In Russian.

The immunological status of mice was investigated at 2-11 months following irradiation with X-rays in doses of 5 gram roentgen. Results show that the immune response to sheep erythrocytes in the spleen was recovered at 5 months after irradiation, but in the lymph nodes it did not return to normal until at least 8 months following irradiation. Hypoplasia of the thymus and lymph nodes was observed in all irradiated mice, while the number of cells in the spleen and bone marrow, as well as the ratio of the T and B lymphocytes in the lymphoid organs, did not differ from normal values. The dependence of the immune response on the dose of antigen was less pronounced in the irradiated animals than in the controls, while the dynamics of the immune response were identical in both groups. It is concluded that there are distinctions between the later immunosuppression and the immunological insufficiency during acute radiation sickness, and that there is organ specificity in the postirradiation recovery of different parts of the lymphoid system. N.B.

**A82-46869 †** Cell dynamics in the lymphoid organs during long-term administration of tritium oxide in varying doses (Dinamika kletok v limfoidnykh organakh pri dlitel'nom vvedenii oksidi tritiia v raznykh kolichestvakh). L. D. Murzina and K. N. Muksinova. *Radiobiologiya*, vol. 22, May-June 1982, p. 365-368. 12 refs. In Russian.

**A82-46870 †** The radiobiological effect of alpha-emitting radionuclides incorporated in the lungs. I - The microdistribution in the lungs of

insoluble dust which contains thorium-232 (Radiobiologicheskoe deistvie inkorporirovannykh v legkikh alpha-izluchaiushchikh radionuklidov. I - Mikro raspredelenie v legkikh nerastvorimykh pylei, soderzhashchikh torii-232). V. A. Kut'kov, V. I. Ivanov, L. N. Burykina, L. T. Elovskaya, L. G. Makeeva, and N. A. Pavlovskaya (Akademiia Meditsinskikh Nauk SSR, Moscow, USSR). *Radiobiologiya*, vol. 22, May-June 1982, p. 369-373. 14 refs. In Russian.

**A82-46871 †** The effect of the intravenous injection of neptunium-237 oxalate on the gonads of rats and on their progeny (Vliianie vnutrivennogo vvedeniia oksalata neptuniia-237 na gonady krysa i ikh potomstvo). E. P. Ovcharenko and T. P. Fomina. *Radiobiologiya*, vol. 22, May-June 1982, p. 374-378. 8 refs. In Russian.

**A82-46872 †** The generation function as a biologically significant parameter for the hygienic normalization of a low-frequency electric field (Generativnaia funktsiia kak biologicheskii znachimyi pokazatel' pri gigienicheskom normirovanii elektricheskogo polia nizkoi chastoty). Iu. D. Dumanskii and L. G. Andrienko (Nauchno-Issledovatel'skii Institut Obshchei i Kommunal'noi Gigieny, Kiev, Ukrainian SSR). *Gigiena i Sanitariia*, July 1982, p. 27-30. 8 refs. In Russian.

The effects on the generation function and the progeny of rats were investigated during long-term exposures (4-5 months) of the animals to an electric field at an industrial frequency (50 Hz) and at field strengths of 0.5, 1.0, and 5 kV/m. Results show that field strengths of 1-5 kV/m during long-term exposures do not give rise to sterility, but do exert a harmful effect on the cells of the sex organs of both male and female animals, as well as on the embryogeny and the post-natal development of the progeny. However, field strengths of 0.5 kV/m do not result in statistically significant changes from the normal generation function. It is recommended that field strengths of no greater than 0.5 kV/m be used for power lines in inhabited areas. N.B.

**A82-46873 †** Concerning the investigation of the condition of the cardiovascular system in experiments on animals (K voprosu izucheniia sostoianiia serdechno-sosudistoi sistemy v eksperimente na zhivotnykh). B. D. Abramov and R. A. Riazanova (Moskovskii Nauchno-Issledovatel'skii Institut Gigieny, Moscow, USSR). *Gigiena i Sanitariia*, July 1982, p. 51, 52. In Russian.

The paper examines EKG data concerning the effects of pesticides on the cardiovascular system of rats, and discusses certain methodological aspects of such investigations. The development of an EKG 'atlas' which reflects the pathology of the myocardium under the effects of pesticides is discussed. B.J.

**A82-46874 †** Methods used in hygiene for the investigation of the nonspecific resistivity of the body (Metody issledovaniia nespetsificheskoi rezistentnosti organizma, ispol'zuemye v gigiene). V. Ia. Gol'ikov and L. A. Tarankenko (Tsentral'nyi Institut Usovershenstvovaniia Vrachey, Moscow, USSR). *Gigiena i Sanitariia*, July 1982, p. 52-55. 29 refs. In Russian.

Various methods for investigating the nonspecific resistivity of the human body are considered. Particular attention is given to determinations of the phagocytic activity of leukocytes, the opsonin titer in the blood plasma, acid and base phosphatase in the leukocytes, lysozyme, and the bactericidal activity of the blood plasma and epithelium. It is noted that indices of immunological reactivity are a highly sensitive criterion for determining the effect of environmental factors on the body. This suggests that immunological methods should be used more widely in hygienic studies. B.J.

**A82-46876 †** The superoxide radical and superoxide dismutase in the free radical theory of ageing /Review/ (Superoksidnyi radikal i superoksid-dismutaza v suobodnoradikal'noi teorii starenia /Obzor/). V. A. Gusev and L. F. Panchenko (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Voprosy Meditsinskoi Khimii*, vol. 28, July-Aug. 1982, p. 8-25. 140 refs. In Russian.

A review is presented on the role in ageing of superoxide radicals and other intermediates of the single electron reduction of oxygen, and on the function of superoxide dismutase in the prolongation of life. The significance of direct and indirect methods for the estimation of the total amount of superoxide radicals is evaluated, and the possible role of superoxide radicals and superoxide dismutase in the regulation of cell division and differentiation is examined. It is shown that the life span of cells in peripheral circulation is correlated with the content of superoxide dismutase in these cells and with their ability to generate superoxide radicals. N.B.

**A82-46877 †** The content of the luteinizing hormone in the hypothalamus depending on the physiological condition of rats (Soderzhanie liuteiniziruiushchego gormona v gipotalamuse v zavisimosti ot fiziologicheskogo sostoianiia krysa). O. G. Krivosheev, N. A. Nabatchikova, V. A. Isaichenkov, S. P. Veselova, and E. A. Siutkin (Ministerstvo Zdravookhraneniia SSSR, IV Glavnoe Upravlenie, Moscow, USSR). *Voprosy Meditsinskoi Khimii*, vol. 28, July-Aug. 1982, p. 126-131. 16 refs. In Russian.

**A82-46878 †** The activity of the microsomal hydroxylases according to age in healthy individuals (*Aktivnost' mikrosomal'nykh gidroksilaz v vozrastnom aspekte n prakticheski zdorovykh liudei*). R. S. Subbotina (Novosibirskii Meditsinskii Institut, Novosibirsk, USSR). *Voprosy Meditsinskoi Khimii*, vol. 28, July-Aug. 1982, p. 94, 95. 12 refs. In Russian.

**A82-46879 †** The metabolic mechanisms of several types of muscle atrophy during muscle inactivity (*Metabolicheskie mekhanizmy atrofii myshts raznogo tipa pri ikh bezdeistvii*). L. A. Goncharova, V. A. Kazarian, T. Iu. Shipilova, and E. A. Rapoport (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Voprosy Meditsinskoi Khimii*, vol. 28, July-Aug. 1982, p. 105-109. 15 refs. In Russian.

The biochemical mechanisms of the development of muscle atrophy from disuse were investigated by studying the changes in the biosynthesis of proteins in vivo in immobilized red (m. soleus) and white (m. extensor digitorum longus) muscles of rats. Results show that the rate of protein biosynthesis (as calculated per mass unit of total RNA) increased in the white muscle on the 4th and 14th day, but was unaltered on the 7th day following surgery, while this rate was found to decrease in the red muscle for each measurement period. It is concluded that the metabolic mechanism of atrophy varies according to the function of the muscle, and the atrophy can be attributed to decreased protein biosynthesis in the red muscle, but to increased protein degradation in the white muscle. N.B.

**A82-46880 †** The relationship between the formation of ATP that is stimulated by insulin and the effect of insulin on the accumulation of creatine in cytoplasmic-membrane-enriched particles from rat skeletal muscles (*Sviaz' stimulirovannogo insulinom obrazovaniia ATF s deistviem insulina na nakoplenie kreatina v obogashchennykh plazmaticheskimi membranami chastitsakh iz skeletnykh myshts krysy*). A. A. Karelin and B. V. Vtiarin (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Voprosy Meditsinskoi Khimii*, vol. 28, July-Aug. 1982, p. 118-123. 29 refs. In Russian.

**A82-46881 †** The activities of the dehydrogenases of the Krebs cycle and the enzymes of tissue respiration during myocardial necrosis in stress-impaired rats (*Aktivnost' dehidrogenaz tsikla krebsa i fermentov tkanevogo dykhanii pri nekroze miokarda U krysy, podvergnutykh stressu*). V. V. Davydov and V. S. Iakushev (Orenburgskii Meditsinskii Institut, Orenburg, USSR). *Voprosy Meditsinskoi Khimii*, vol. 28, July-Aug. 1982, p. 34-37. 20 refs. In Russian.

**A82-46882 †** The inhibition of the biosynthesis of cholesterol and phospholipids by hydrocortisone in the liver of rats (*Tormozhenie kortizolom biosinteza kholesterina i fosfolipidov v pecheni krysy*). V. N. Titov, V. M. Sanfirova, T. D. Khodakova, and I. G. Kantardzhian (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Voprosy Meditsinskoi Khimii*, vol. 28, July-Aug. 1982, p. 38-42. 19 refs. In Russian.

**A82-46883 †** The possible mechanisms of lipid peroxidation in rat liver during the recovery period after mechanical asphyxia (*O vozmozhnykh mekhanizmkh perekisnogo okisleniia lipidov pecheni krysy v vosstanovit'el'nom periode posle mekhanicheskoi asfiksii*). V. D. Konval, A. V. Lukoshkin, and V. B. Smirnova (Omskii Meditsinskii Institut, Omsk, USSR). *Voprosy Meditsinskoi Khimii*, vol. 28, July-Aug. 1982, p. 42-46. 28 refs. In Russian.

**A82-46884 †** The effect of myocardial ischemia on the phospholipid content of heart tissue and mitochondria (*Vliianie ishemii miokarda na fosfolipidnyi sostav serdechnoi tkani i mitokhondrii*). A. I. Toleikis, A. I. Dagis, and A. K. Prashkiavichius (Kaunasskii Meditsinskii Institut, Kaunas, Lithuanian SSR). *Voprosy Meditsinskoi Khimii*, vol. 28, July-Aug. 1982, p. 64-67. 22 refs. In Russian.

The effect of the total ischemia of the heart on the content of phospholipids in both the tissues and mitochondria of the heart were investigated in rabbits. Results show that the concentration of lysophosphatidyl choline increased slightly in the heart tissue within 30 minutes after total myocardial ischemia, but it decreased distinctly within 1 hour after ischemia, as compared to control values. The concentration of lysophosphatidyl choline in the mitochondria increased during both periods (0.5 hr, 1 hr), but the phospholipid content returned to control levels within 2 hours after ischemia. The changes in the total phospholipid content were similar in the heart tissue and mitochondria, but the separate phospholipid fractions (lysophosphatidyl choline and cardiolipin) varied more distinctly in the mitochondria. It is concluded that phospholipases appear to be initially involved in the degradation of mitochondrial phospholipids in ischemically impaired cells. N.B.

**A82-46885 †** The protective effect of psychotropic drugs diazepam, sodium hydroxybutyrate, and mebicar during experimental arrhythmia (*O zashchitnom effekte psikhotropnykh preparatov diazepam, natriia oksibutirata i mebikara pri eksperimental'nykh aritmiiakh*). R. A. Kamburg and I. E. Zimakova (Kazanskii Meditsinskii Institut, Kazan, USSR). *Farmakologiya i Toksikologiya*, vol. 45, July-Aug. 1982, p. 16-19. 16 refs. In Russian.

The effects of the common psychotropic agents diazepam (1-2 mg/kg) sodium hydroxybutyrate (50-100 mg/kg) and mebicar (250-500 mg/kg) were investigated in rats subjected to experimental arrhythmia that was induced by injections of calcium chloride and strophanthin K. Results show that all three drugs produce a protective effect in the animals against arrhythmia induced by strophanthin K, but only sodium hydroxybutyrate and diazepam affect calcium chloride-induced arrhythmia. All three drugs reduce the level of glucoside intoxication, which may be linked to their stress protective and antihypoxic properties. On the other hand, the drugs exert a true antiarrhythmic effect by interfering with the potassium ion balance. N.B.

**A82-46886 †** The variations in the content of histamine in the tissues of the heart and stomach during the excessive stimulation of the organism and the influence of hexamethonium on these variations (*Izmeneniia soderzhaniiia gistamina v tkaniakh serdtsa i zheludka pri chrezvychainom vozdeistvii na organizm i vliianie geksoniiia na eti izmeneniia*). V. V. Buf'on (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Farmakologiya i Toksikologiya*, vol. 45, July-Aug. 1982, p. 35-37. 13 refs. In Russian.

**A82-46887 †** The effect of cholestyramine on the metabolism of lipoproteins in the blood of rats (*Vliianie kholestiramina na metabolizm lipoproteidov v krvi krysy*). M. G. Tvorogova, V. N. Titov, and V. M. Sanfirova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Farmakologiya i Toksikologiya*, vol. 45, July-Aug. 1982, p. 48-51. 18 refs. In Russian.

**A82-46888 †** The induction of the formation of morphine-binding spleen cells as a manifestation of the immune response (*Induksiia obrazovaniia kletok selezenki, svyazyvaiushchikh morfina, kak proiavlenie immunnogo reakttsii*). I. E. Kovalev, O. Iu. Polevaia, and L. A. Basharova (Nauchno-Issledovatel'skii Institut po Biologicheskim Ispytaniim Khimicheskikh Soedinenii, Kupavna, USSR). *Farmakologiya i Toksikologiya*, vol. 45, July-Aug. 1982, p. 58-61. In Russian.

**A82-46889 †** A system of methodological approaches to the evaluation and prognostication of the hemodynamic effects of hypotensive and antianginal compounds (*Sistema metodicheskikh podkhodov k otsenke i prognozirovaniu gemodinamicheskikh effektov gipotenzivnykh i antianginal'nykh sredstv*). R. M. Zaslavskaya, R. D. Zolotaia, and V. I. Trubnikov (Nauchno-Issledovatel'skii Institut po Biologicheskim Ispytaniim Khimicheskikh Soedinenii, Moscow, USSR). *Farmakologiya i Toksikologiya*, vol. 45, July-Aug. 1982, p. 110-114. In Russian.

A system of methodological approaches to the evaluation and prediction of the hemodynamic effects of hypotensive and antianginal compounds is proposed. The system utilizes clinical and pharmacological tests such as the blood pressure, heart rate, and the height and weight of individuals throughout the population, as well as studies of both monozygotic and dizygotic twins. The system provides a comparative evaluation of the efficiency of cardiovascular agents, the prediction of their hemodynamic effects, and an appraisal of the contribution of genetic and environmental factors to the phenotypic variability of these effects. N.B.

**A82-46890 †** The effect of humoral factors of the lymph tissues on hemopoietic stem cells (*Vliianie gumoral'nykh faktorov limfoidnoi tkani na stvolovye gemopoieticheskie kletki*). D. R. Kaulen and T. A. Golobanova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii*, July 1982, p. 3-9. 22 refs. In Russian.

**A82-46891 †** Current views of anaphylaxis as one of the forms of manifestation of the body's reactivity (*Sovremennye vozzreniia na anafilaksiu kak odnu iz form proiavleniia reaktivnosti organizma*). A. A. Vorob'ev and S. S. Afanas'ev. *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii*, July 1982, p. 9-14. 55 refs. In Russian.

Anaphylaxis is a highly sensitive and specific immunological reaction and is used as a test of the specificity of various antigens. The literature on anaphylaxis as a test of reactivity is surveyed, and it is shown that the use of tests based on the manifestation of anaphylaxis makes possible a complex evaluation of the body's immunological reactivity. The fact that the immediate and latent types of anaphylaxis have a common pathogenesis supports the view that immunity is a resultant reaction on the part of most of the organs and systems of the body. This commonality also puts in doubt the absolute validity of using anaphylaxis as a test of the B-system of immunity. B.J.

**A82-46892 †** The transformation of lipids into glycogen in animal and human cells (*Transformatsiia lipidov v glikogen v kletkakh zhivotnykh i cheloveka*). N. P. Lebkova (Tsentral'nyi Institut Usovershenstvovaniia Vrachei, Moscow, USSR). *Arkhiv Patologii*, vol. 44, no. 6, 1982, p. 68-76. 70 refs. In Russian.

A review is presented of studies concerning the accumulation of glycogen in the cells of animals and humans during various kinds of pathological conditions,

including those in which the entry of glucose into the cell is restricted or blocked. An intracellular accumulation of glycogen is found during the excessive entry and accumulation of lipids, during which glycogen accumulates in the microbodies and lysosomes, as well as in the cytoplasm. A tight structural complex of lysosomes, microbodies, lipids, and glycogen granules is observed in these cells. It is suggested that these ultrastructural findings, as well as the results of biochemical studies about the presence of lipid-oxidizing enzymes in the microbodies and lysosomes, are evidence of the participation of microbodies and lysosomes both in the process of the break down of lipids into intermediary products of metabolism and in the formation of glycogen from these products. It is concluded that the transformation of lipids into glycogen has a great adaptive significance for the increasing of the energy of the cells and for the prevention of fatty dystrophy.

N.B.

**A82-46893 † The health condition of apparently healthy workers at oil-processing plants (Sostoianie zdorov'ia prakticheskii zdorov'kh rabochikh neftepererabatyvaiushchikh zavodov).** L. M. Karamova and R. S. Ostrovskaya (Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevani, UFA, USSR). *Sovetskoe Zdravookhranenie*, no. 7, 1982, p. 9-11. In Russian.

**A82-46894 † The age-related features of the incidence of sickness for female workers in the main branches of the clothing industry (Osobenosti zaboлеваemosti rabotnits osnovnykh professii shveinogo proizvodstva s uchetoм vozrasta).** V. N. Bugaev (Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR). *Sovetskoe Zdravookhranenie*, no. 7, 1982, p. 11-14. 6 refs. In Russian.

**A82-46895 † The problem of aging and death in modern biology (Problema starenia i smerti v sovremennoi biologii).** V. P. Voitenko. *Voprosy Filosofii*, no. 6, 1982, p. 93-101. 19 refs. In Russian.

The need for an evolutionary approach that regards longevity and the rate of aging as closely bound up with all the parameters determining the degree to which a species has adapted, in the Darwinian sense, is stressed. Aging as a side effect of evolution is discussed, together with mathematical models of aging.

C.R.

**A82-46896 † The effect of acute brain hypoxia on the permeability of the blood-ophthalmic barrier (Vlianie ostroi gipoksii golovnogo mozga na pronitsaemost' gematooftal'micheskogo bar'era).** T. V. Birich and S. A. Ereimenko (Minskii Meditsinskii Institut, Minsk, Belorussian SSR). *Vestnik Oftalmologii*, Jan.-Feb. 1981, p. 26-30. 10 refs. In Russian.

**A82-46897 † Clinical aspects of the effects of an alternating magnetic field on post-operation complications (Klinicheskie aspekty vozdeistviia peremennogo magnitnogo polia na posteoperatsionnye oslozhneniia).** A. A. Verzin (II Moskovskii Meditsinskii Institut, Moscow, USSR) and L. N. Kolesnikova (Nauchno-Issledovatel'skaia Laboratoriia Mikrokhirurgii Glaza, USSR). *Vestnik Oftalmologii*, May-June 1982, 56, 57. In Russian.

**A82-46898 † Side effects of cardiovascular drugs on the eye (Pobochnoe vlianie na organ zreniia preparatov serdechno-sosudistogo deistviia).** V. P. Mozheronkov and E. J. Finkel'berg (Moskovskii Oblastnoi Nauchno-Issledovatel'skii Klinicheski Institut, Moscow, USSR). *Vestnik Oftalmologii*, May-June 1982, p. 67-69. 36 refs. In Russian.

**A82-46916 # The echography - Doppler experiment on Salyut 7.** D. Kaplan, J. C. Germain, A. Cohen (Matra, S.A., Paris, France), and N. Infante (INTERLEC, France). *International Astronautical Federation, International Astronautical Congress, 33rd, Paris, France, Sept. 27-Oct. 2, 1982, Paper 82-23*. 6 p.

A Doppler echotomography experiment performed on board the Salyut 7 space station by French astronaut to explore the human body using ultrasonic means is described. The apparatus was designed to allow monitoring of the fundamental parameters of the cardiac function and cardiovascular circulation in adaptation to physical effort in space flight. The machine featured the capability for scans using a 3.5 MHz array with 15 cm depth and 9 cm width in the field of view (FOV), and a 5 MHz array with a 7.5 cm depth and 4.5 cm width FOV. Spatial resolution is 1 mm with 16 gray levels at 50 images/sec with the first mode, and 0.5 mm resolution with 16 gray levels at 100 images/sec with the second mode. A T.M. echography selection allows imaging of the time evolution of echoes in a narrow ultrasonic beam with brilliance related to echo amplitude, thus permitting monitoring of fast organ movements. The Doppler mode reveals information on blood speed. Operation of the television monitoring system, the ECG functions, and in recording modes are outlined.

M.S.K.

**A82-46973 # A new eye movement recording system for vestibular research.** D. Masse, A. Lavaitte, G. Pleyber, A. Berthoz, and J. Droulez. *International Astronautical Federation, International Astronautical Congress, 33rd, Paris, France, Sept. 27-Oct. 2, 1982, Paper 82-173*. 13 p.

The Eye Movement Measurements in the Infrared (EMIR) systems, designed for a European experiment which will fly on the first Spacelab mission, is discussed. The main characteristics of eye movements, including direction, amplitude, and velocity, are described, and the specifications of an eye-movement recording system and of the EMIR system are stated. The advantages and drawbacks of electrical, magnetic, and optical eye movement recording systems are summarized. The measurement method of EMIR is then detailed, including experimental mounting, horizontal and vertical movements, calibration, and counter-rolling movements. Finally, future uses of EMIR are briefly discussed, including space missions.

C.D.

**A82-46974 # Mathematical modelling of physiological functions in space flight.** V. V. Verigo, V. G. Shabel'nikov, A. I. D'achenko, T. N. Smirnova, and I. V. Arsent'eva (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *International Astronautical Federation, International Astronautical Congress, 33rd, Paris, France, Sept. 27-Oct. 2, 1982, Paper 82-176*. 12 p. 15 refs.

Numerical models are described for relating respiratory parameters measured during space flight to the fluid-electrolyte balance, erythropoiesis, and systemic and pulmonary circulation. Thy pulmonary gas-exchange model is noted to have been formulated with data from space-flight conditions, while numerical modeling is substituted for the other physiological parameters, which require more elaborate instrumentation. Fluid losses were found to provoke a homeostatic reaction in the blood. The blood volume decreases in microgravity, as does the strength of cardiac contraction and of the venous tone. A nonhomogeneous lung function model, using an equation for stationary flow of a Newtonian fluid in branch-like soft tubes, and a 10-layer lung (gas-exchange chambers) revealed that pulmonary arterial blood pressure exerts the most significant effect on the regional distribution of blood flow and alveolar ventilation in a gravity field.

M.S.K.

**A82-46975 \* # Sensitivity analysis of physiological factors in space habitat design.** J. Billingham (NASA, Ames Research Center, Moffett Field, CA). *International Astronautical Federation, International Astronautical Congress, 33rd, Paris, France, Sept. 27-Oct. 2, 1982, Paper 82-179*. 13 p. 18 refs.

The costs incurred by design conservatism in space habitat design are discussed from a structural standpoint, and areas of physiological research into less than earth-normal conditions that offer the greatest potential decrease in habitat construction and operating costs are studied. The established range of human tolerance limits is defined for those physiological conditions which directly affect habitat structural design. These entire ranges or portions thereof are set as habitat design constraints as a function of habitat population and degree of ecological closure. Calculations are performed to determine the structural weight and cost associated with each discrete population size and its selected environmental conditions, on the basis of habitable volume equivalence for four basic habitat configurations: sphere, cylinder with hemispherical ends, torus, and crystal palace.

C.D.

**A82-46976 # A French primate study program for physiological problems encountered in weightlessness (Programme français d'étude sur primates des problèmes physiologiques rencontrés en microgravité).** P. C. Pesquies, C. Milhaud, C. Nogues, M. Klein, B. Cailler (Centre d'Etudes et de Recherches de Médecine Aérospatiale, Paris, France), and R. Bost (Centre National d'Etudes Spatiales, Paris, France). *International Astronautical Federation, International Astronautical Congress, 33rd, Paris, France, Sept. 27-Oct. 2, 1982, Paper 82-184*. 14 p. In French.

The development of an experimental program using monkeys as human surrogates to examine the long-term effects of weightlessness is traced, with indications of experiments to be carried out on Spacelab. Primates were chosen because of the high transferability of test results to human reactions under the same conditions. Immobilization has been used in ground-based experiments on rhesus macaque monkeys, which have been fixed in a supine position, back down, with head tilted from 4-12 deg below the horizontal. An experimental module called MEPP is described, which was configured for adaptation to Space-lab. The primates are monitored for BPR, ECG, core temperature, arterial pressure, volume and frequency of evacuation, and for performance in operant conditioning. Additional use is made of the experimental design in the French-Soviet Biocosmos program, and mention is made of self-sustaining equipment in orbit as a means of true long-term testing.

M.S.K.

**A82-46977 # Cardiovascular effects of simulated zero-gravity in humans.** F. Bonde-Petersen, Y. Suzuki, T. Sadamoto (Copenhagen, Universitet, Copenhagen, Denmark), and N. J. Christensen (County Hospital, Herlev, Denmark). *International Astronautical Federation, International Astronautical Congress, 33rd, Paris, France, Sept. 27-Oct. 2, 1982, Paper 82-189*. 14 p. 12 refs. Research supported by the Danish Space Board and Statens Lægevidenskabelige Forskningsrad.

Head-down and head-up tilted bedrest (5 degrees) and head out water immersion (HOWI) for 6 hours were compared as simulation models for mimicking the conditions of zero gravity. Among the parameters examined were cardiac output, blood pressure, total peripheral (TPR) and forearm vascular (FVR) resistances, Hct, the relative plasma volume (PV) changes, and plasma catecholamines. Results show a decrease during HOWI in TPR, FVR, mean arterial pressure, Hct,

and PV. In addition, the levels of catecholamines were found to be 30-50% lower than those found during both +5 and -5 degrees bedrest. During head down tilt, the mean arterial pressure was elevated and the catecholamine level remained constant, while TPR and FVR slowly decreased over 6 hours. It is concluded that HOWI is a stronger stimulus than 05 degrees bedrest, probably because HOWI elevates central venous pressure more markedly by emptying the peripheral veins, while bedrest permits a distension of the veins which induces an increase in sympathetic nervous activity. N.B.

**A82-47004 # The psychology and safety of weightlessness.** B. J. Bluth (California State University, Northridge, CA). *International Astronautical Federation, International Astronautical Congress, 33rd, Paris, France, Sept. 27-Oct. 2, 1982, Paper 82-252.* 8 p. 44 refs.

Various potential sources of psychological and behavioral anomalies both in space missions and in isolated and confined ground environments are discussed. Types and causes of accidents and errors and factors involved in errors are summarized, and space flight and analog experiences are described in detail. The analog experiences include oceanographic research vessels, submarines, undersea laboratories, space simulators, and polar stations. Both American and Soviet spaceflight experiences are covered. The effects of physiological factors and psychosocial factors such as conflicting functions, group size, and group composition are examined. C.D.

**A82-47061 # Results of studies of pulmonary ventilation in cosmonauts during the period of acute adaptation to weightlessness.** A. M. Genin, V. M. Baranov, B. L. Avetisjanc (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR), H. Haase, G. König, and S. Schwesinger (Institute of Aviation Medicine, Königsbrück, East Germany). *International Astronautical Federation, International Astronautical Congress, 33rd, Paris, France, Sept. 27-Oct. 2, 1982, Paper 82-431.* 7 p.

The changes and the character of the parameters of external ventilation were studied during flights aboard the orbital station Salyut 6, and the possible mechanisms of their development during the period of acute adaptation to weightlessness were examined. Results show that the respiratory minute volume at rest increased significantly during weightlessness, and the values obtained during exercise were lower than those found on earth. The respiratory rate at rest also increased during the flight, while the tidal volume during muscular exercise was reduced under conditions of weightlessness. A slight increase of the vital capacity both before and during the flight was found to be produced by a slight pressure on the thighs (5.3 kPa/40 mm Hg), while lower body negative pressure did not change the vital capacity homogeneously. N.B.

**A82-47063 # The effect of microgravity on the reproduction rhythm of plant cells.** N. V. Viktorova, P. G. Sidorenko, and V. M. Fomicheva (Ukrainian Academy of Sciences, Institute of Botany, Kiev, Ukrainian SSR). *International Astronautical Federation, International Astronautical Congress, 33rd, Paris, France, Sept. 27-Oct. 2, 1982, Paper. 7 p.* 6 refs.

The proliferative activity to the meristematic cells of 3-days pea plantlet root and Haplopappus culture cells was studied under various kinostatic conditions. The two-week kinostat treatment of Haplopappus cells at 50 rpm caused a change in the circadian rhythm of their mitotic activity. No change was observed in the circadian rhythm of pea meristematic cells under the same kinostatic conditions. Possible mechanisms of the change in the circadian rhythm of cell reproduction are discussed. (Author)

**A82-47065 # Presentation of 'echography' experiment.** L. Pourcelot, J.-M. Pottier, M. Berson, Ph. Arbeille, G. Fleury, F. Patat (Tours, Université, Tours; Centre Hospitalier Universitaire Ranguet, Toulouse, France), and A. Gell (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *International Astronautical Federation, International Astronautical Congress, 33rd, Paris, France, Sept. 27-Oct. 2, 1982, Paper. 11 p.*

Known physiological modifications due to living in a zero-g environment are reviewed, and experiments to study changes in the CV system using echography on board the Salyut 7 space station are described. The goal of the experiment was to add to the data base regarding human physiological adaptation to space life. The experimenter, also the subject, attached ECG leads and positioned himself for microwave noninvasive sounding. A CW Doppler mode was also used, with the return signal known to be altered proportionally to the instantaneous blood velocity. Scanning the heart, liver, and abdominal vessels at 3 MHz helped examine deep muscles, and use of the B-mode and CW Doppler apparatus at 5 MHz measured the blood circulation. Comparisons were made of preflight, in-flight, and post-flight readings. M.S.K.

**A82-47075 Preparation of ultraclean gloves for precision assembly operations.** M. E. Lacy (Rockwell International Corp., Autonetics Strategic Systems Div., Anaheim, CA). *Journal of Environmental Sciences*, vol. 25, Sept.-Oct. 1982, p. 36-39. 8 refs.

**A82-47095 † Control of a walking machine with almost weightless legs. II - A discrete model (Upravlenie shagaiushchim apparatom s pochti**

**nevesomyimi nogami. II - Diskretnaia model').** V. B. Larin and K. I. Naumenko. *Akademiia Nauk SSSR, Izvestia, Mekhanika Tverdogo Tela*, July-Aug. 1982, p. 36-44. 6 refs. In Russian.

A discrete approach is taken to the control of a singularly perturbed periodic system, the walking machine being considered as a discrete controlled system. A small parameter epsilon is introduced, and it is shown that when epsilon tends to zero a discrete control strategy is obtained for a walking machine with weightless legs. Particular attention is given to the behavior of a boundary layer in the discrete singularly perturbed problem. B.J.

**A82-47273 Remote manipulators in industry and space.** D. E. Flinchbaugh (I.C.S.D. Corp., Kissimmee, FL). In: *Making space work for mankind; Proceedings of the Nineteenth Space Congress, Cocoa Beach, FL, April 28-30, 1982.* Cape Canaveral, FL, Canaveral Council of Technical Societies, 1982, p. 6-10 to 6-18.

Robotics in industry and space are briefly discussed, and robot applications are listed and graphically illustrated. A mobile remote manipulator system, a robot for servicing a nuclear power steam generator, and remote manipulator spacecraft systems are depicted. Listed are potential robotic arm applications, benefits of a remotely operated service arm, and U.S. academic/institutional and industrial developers of robot vision/optical inspection systems. Graphic, analytical representations of a remote manipulator system and a mechanical arm assembly are provided. C.D.

**A82-47276 Life support system considerations for space station.** M. A. Shuey (United Technologies Corp., Hamilton Standard Div., Windsor Locks, CT). In: *Making space work for mankind; Proceedings of the Nineteenth Space Congress, Cocoa Beach, FL, April 28-30, 1982.* Cape Canaveral, FL, Canaveral Council of Technical Societies, 1982, p. 8-1 to 8-13. 6 refs.

Systems requirements for operation of a space station are reviewed, particularly with regard to life support equipment. The construction of a space station is noted to be a critical factor in the full realization of the STS capabilities. The station would serve for assembly and check-out of large orbiting systems in space, processing, repair, and launch and recovery of spacecraft, accommodate science experiments, and reduce dependence on earth-based services. Modular construction of a space station is outlined, together with basic human life support requirements. Life support equipment, in one study, is projected to account for 35% of a habitable module's weight and 16% of the volume. The equipment would provide a livable environment, oxygen, food, and water, and remove CO<sub>2</sub>, perspiration and respiration water, urine, feces, contaminant gases, and particulates and microbes. Specific systems are discussed for a progressively independent space station from Orbiter-tended to growth phase to a permanently manned 8 member crew space station. M.S.K.

**A82-47277 Application of ATP assay technique, developed to detect extraterrestrial life, for rapid detection of human infections.** A. M. Dhople (Florida Institute of Technology, Melbourne, FL). In: *Making space work for mankind; Proceedings of the Nineteenth Space Congress, Cocoa Beach, FL, April 28-30, 1982.* Cape Canaveral, FL, Canaveral Council of Technical Societies, 1982, p. 8-30 to 8-42.

A review is presented of the application of an ATP assay, first developed by NASA for the detection of extraterrestrial life, for use as a simple, fast, and accurate procedure for detecting and counting bacteria in clinical specimens. This assay technique is based on the bioluminescent reaction of luciferase when mixed with ATP, and the maximum intensity of emitted light in this reaction has a direct linear relationship to the concentration of ATP added. The application of this ATP assay technique to several clinical situations, such as the direct antimicrobial susceptibility testing of organisms found in the urine, is examined. In addition, the adoption of this method for the rapid determination of the metabolic integrity and viability of the leprosy bacillus is examined. It is concluded that this ATP assay method will be an important tool in research on leprosy, since this organism has not yet been grown outside of its natural host and there is no suitable animal model currently available that can be used in endemic areas of the world. N.B.

**A82-47278 Artificial intelligence - Utilization in advanced space missions.** B. Bernabe (Florida Institute of Technology, Melbourne, FL). In: *Making space work for mankind; Proceedings of the Nineteenth Space Congress, Cocoa Beach, FL, April 28-30, 1982.* Cape Canaveral, FL, Canaveral Council of Technical Societies, 1982, p. 8-43 to 8-50.

The use of artificial intelligence (AI) and robotics for outer space exploration and exploitation is discussed. Terrestrial applications are projected in terms of remote sensing satellites which could search for certain features of request, based on a world model stored within the spacecraft's on-board memory. Usage of a flexible human-oriented language would permit queries placed by untrained persons on the ground. Space manufacturing in LEO could be carried out for solar power, communication, and telescope satellites, using materials from the moon and asteroids. Self-replicating systems placed on the moon are envisioned as producing mining units from lunar materials with actions based on preprogrammed models. Finally, attention is given to AI and robots for outer planets and

interstellar exploration, as well as to technology needs in the fields of alternative computer logics, self-constructing knowledge, and procedural sequencing.

M.S.K.

**A82-47279 The human spirit in space.** B. J. Bluth (California State University, Northridge, CA). In: *Making space work for mankind*; Proceedings of the Nineteenth Space Congress, Cocoa Beach, FL, April 28-30, 1982.

Cape Canaveral, FL, Canaveral Council of Technical Societies, 1982, p. 8-51 to 8-56. 24 refs.

The problems of interpersonal and individual strain that may result from extended space flights are considered on the basis of research findings on the performance of people in isolated and confined terrestrial environments, and are related to the results of the Soviet experience in the Salyut 6 orbital station. The results of research looking at small groups in confined, isolated, and stressful environments, including the Antarctic, submarines, oceanographic research vessels, undersea research labs, and especially designed simulations, are reviewed. It is shown that while none of these situations exactly replicates permanent human operation of a space facility, some of the predictions of these studies have been verified in the Soviet experiences aboard the Salyut 6 orbital station. The relevant social and psychological factors are summarized and are examined for their impact on extended space flights.

N.B.

**A82-47280 \* A study in motion sickness - Saccular hair cells in the adult bullfrog.** G. M. Cohen (Florida Institute of Technology, Melbourne, FL), M. Reschke, and J. Homick (NASA, Johnson Space Center, Neurophysiological Laboratory, Houston, TX). In: *Making space work for mankind*; Proceedings of the Nineteenth Space Congress, Cocoa Beach, FL, April 28-30, 1982.

Cape Canaveral, FL, Canaveral Council of Technical Societies, 1982, p. 8-57 to 8-61. 9 refs.

The bullfrog's sacculi were examined using light and scanning electron microscopy. No evidence of a striola was found. Type A hair cells were not only distributed peripherally, but also throughout the central macula, though far less frequently than the dominant type D. Two primary hair cell types were distinguished, which corresponded to the ciliary patterns: type A cilia are associated with short, conical hair cells, and type D cilia are associated with long, cylindrical hair cells. Each displays at least one subtype, which may represent developmental precursors. The otolithic membrane is crisscrossed with tunnels and topped with statoconia.

(Author)

**A82-47331 Effects of various countermeasures against the adverse effects of weightlessness on central circulation in the healthy man.** O. G. Gazenko, V. I. Shumakov, L. I. Kakurin, V. E. Katkov, V. V. Chestukhin, E. M. Nikolaenko, S. V. Gvozdev, V. V. Rumiantsev, and V. V. Vasil'ev (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem; USSR Ministry of Health, Institute of Transplantation and Artificial Organs, Moscow, USSR). *Aviation, Space, and Environmental Medicine*, vol. 53, June 1982, p. 523-530. 19 refs.

The effect of lower body negative pressure, local negative pressure below the knee joint, and both pneumatic and mechanical occlusion cuffs at the upper third of the femur on central circulation, oxidative metabolism, and acid-base equilibrium of blood was studied on eight healthy male volunteers with double-lumen Swan-Ganz flow-directed thermodilution catheters implanted for 7 d into the pulmonary artery. The counter-measures against the adverse effects of weightlessness were used in two regimens: regimen 1 at -30, -50, +40 torr and regimen II at -60, -100, and +60 torr. The parameters were recorded in recumbency, during the headup tilt at 70 deg for 15 min, and then during the head-down tilt at -20 deg for 60 min. After the first 20 min at anti-orthostasis, the effects of the above countermeasures in the two regimens were investigated. The tile-induced changes in central circulation, those observed during application of the counter-measures, and the effect of different countermeasures were studied on a comparative basis. It was demonstrated that the highly informative method of implantation of catheters into the pulmonary artery can be successfully used in biomedical investigations of normal men.

(Author)

**A82-47332 Proliferation kinetics of Paramecium Tetraurelia in balloon-borne experiments.** F. Croute, J. P. Soleilhavoup, S. Vidal, R. Rousseille, and H. Planel (Toulouse III, Université, Toulouse, France). *Aviation, Space, and Environmental Medicine*, vol. 53, June 1982, p. 531-536. 19 refs. Centre National d'Etudes Spatiales Contract No. 213.

Experiments were carried out to demonstrate the effects of cosmic radiation, at a balloon-flight ceiling of about 36,500 m (120,000 ft) on single-cell organism proliferation. *Paramecium tetraurelia* were placed in air-tight containers and maintained at 25 plus or minus 0.1 C. Cellular growth was determined by cell count, either after recovery or during the flight, by means of an automatic fixation device. Dosimetry was performed by a tissue equivalent proportional counter and was of about 0.5 mrad/h. Flight ceiling duration ranged from 48 min - 22 h. A secondary stimulating effect of growth rate, preceded by a temporary decrease, was observed after recovery. Because of the high bacterial concentration in the trans-Mediterranean flight culture medium, the temporary drop of the growth rate, due to the radiolysis products, disappears. It is considered that the stimulating

effect can be the result of enzymatic intracellular scavenging of radiolysis products generated in the cell.

(Author)

**A82-47333 Human endocrine responses to acceleration stress.** F. J. Mills (RAF, Institute of Aviation Medicine, Farnborough, Hants, England) and V. Marks (Surrey, University, Guildford, England). *Aviation, Space, and Environmental Medicine*, vol. 53, June 1982, p. 537-540. 24 refs.

Five healthy male volunteers were subjected to accelerations of up to +6 Gz for 1 min in order to investigate the effect of acceleration stress upon the concentration of various hormones in peripheral blood. No significant changes were seen in the levels of GH, PRL, TSH, LH, and FSH compared to control values obtained at +1 Gz (normal gravity). Changes in serum cortisol levels were significant (p less than 0.001) with peak values occurring 20 min after acceleration stress. A significant effect (p less than 0.001) of acceleration was also observed on plasma volume with maximum reductions occurring at the end of acceleration. The unusual specificity of the hormone responses is discussed.

(Author)

**A82-47334 The vestibulo-ocular reflex in man during voluntary head oscillation under three visual conditions.** R. M. Jell (Manitoba, University, Winnipeg, Canada), F. E. Guedry, Jr., and W. C. Hixson (U.S. Navy, Naval Aerospace Medical Research Laboratory, Pensacola, FL). *Aviation, Space, and Environmental Medicine*, vol. 53, June 1982, p. 541-548. 24 refs.

The vestibulo-ocular reflex (VOR) generated by voluntary head movements keyed to a tone varying sinusoidally in pitch was studied in 13 men. Modulation of pitch at frequencies ranging from 0.1 - 5.0 Hz yielded systematic variation in head movement frequencies, although above 2 Hz head frequencies fell below requested frequencies. Three conditions of visual stimulation were used. When an earth-fixed visual target was visible, VOR gain (maximum eye velocity/maximum head velocity) was slightly but significantly greater than VOR gain in darkness at all frequencies except 0.1 Hz. With a head-fixed target, VOR gain was substantially less than VOR gain in darkness at all requested frequencies below 2.0 Hz. The findings that visual suppression becomes ineffective at frequencies above 1.0 Hz parallels results obtained in other laboratories during passive whole-body oscillation. Results indicate that the procedures are feasible for further evaluation as part of a clinical test battery.

(Author)

**A82-47335 Apparent instrument horizon deflection during and immediately following rolling maneuvers.** J. M. Lentz and F. E. Guedry, Jr. (U.S. Navy, Naval Aerospace Medical Research Laboratory, Pensacola, FL). *Aviation, Space, and Environmental Medicine*, vol. 53, June 1982, p. 549-553. 11 refs.

There have been recent reports by pilots of apparent visual bending or bowing of instrument horizons during and immediately following ascending rolling maneuvers in the F-14 aircraft. The present study investigates the probability that normal reflex actions may partially account for the illusions cited in these reports. The results of this study suggest that the vestibulo-ocular reflex (VOR) can produce an apparent deflection of the instrument horizon (actually an apparent flicking back and forth) during and after roll maneuvers involving high peak angular velocities. This perceptual aberration could disturb a pilot attempting to use his instrument horizon and could lead him to suspect instrument malfunction. The reported distortions of the instrument horizon could be the result of the VOR, which tends to stabilize the eye relative to the earth during angular acceleration of the head, and therefore reflexly displaces the eye relative to objects such as flight instruments that move with the head.

(Author)

**A82-47336 Motion sickness incidence induced by complex periodic waveforms.** J. C. Guignard (U.S. Navy, Naval Biodynamics Laboratory, New Orleans, LA) and M. E. McCauley (Human Factors Research, Inc., Goleta, CA). *Aviation, Space, and Environmental Medicine*, vol. 53, June 1982, p. 554-563. 21 refs. Contracts No. N00014-73-C-0040; No. N00014-76-WR-60318.

Independent groups of up to 32 young men were exposed in a standard seated posture to one of five conditions of vertical (Z axis) motion for up to 2 h. Exposure was less in the event of vomiting or a volunteer's voluntary withdrawal from the experiment. A control condition, sinusoidal motion at 0.17 Hz and 0.13 G R.M.S., provided the basis for comparison with the remaining four conditions, each produced by the sum of two sinusoids, the fundamental at 0.17 Hz plus the second or third harmonic. The conditions differed in the phase relationship of the fundamental and second harmonic, or in the relative acceleration levels of the two harmonic components. The predicted motion sickness incidence (MSI) for each sinusoid alone was calculated from a previously derived mathematical model and compared with the obtained MSIs. Certain motion conditions provoked unexpectedly high MSIs compared with the control condition. It was found that R.M.S. acceleration is not reliable as the sole predictor of MSI in complex motion. Further data must be obtained before accurate prediction of MSI in broadband motion will be possible.

(Author)

**A82-47337 Influence of a visual display and frequency of whole-body angular oscillation on incidence of motion sickness.** F. E. Guedry, Jr., H. J. Moore (U.S. Navy, Naval Aerospace Medical Research Laboratory, Pensacola, FL), and A. J. Benson (U.S. Navy, Naval Aerospace Medical Research

Laboratory, Pensacola, FL; RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Aviation, Space, and Environmental Medicine*, vol. 53, June 1982, p. 564-569. 24 refs.

Visual search within a head-fixed display consisting of 12 x 12 digit matrix is degraded by whole-body angular oscillation at 0.02 Hz (+ or - 155 degrees/sec peak velocity), and signs and symptoms of motion sickness are prominent in a number of individuals within a 5-min exposure. Exposure to 2.5 Hz (+ or - 20 degrees/sec peak velocity) produces equivalent degradation of the visual search task, but does not produce signs and symptoms of motion sickness within a 5-min exposure. (Author)

**A82-47338 \*** **The relationship of motion sickness susceptibility to learned autonomic control for symptom suppression.** P. S. Cowings (NASA, Ames Research Center, Space Science Div., Moffett Field, CA) and W. B. Toscano (California, University, San Francisco, CA). *Aviation, Space, and Environmental Medicine*, vol. 53, June 1982, p. 570-575. 15 refs. Grant No. NCA2-OR-665-810.

Twenty-four men were randomly assigned to four equal groups matched in terms of their Coriolis Sickness Susceptibility Index (CSSI). Two groups of subjects were highly susceptible to motion sickness, and two groups were moderately susceptible. All subjects were given six C551 tests at 5-d intervals. Treatment Groups I (highly susceptible) and II (moderately susceptible) were taught to control their autonomic responses, using a training method called autogenic-feedback training (AFT) before the third, fourth, and fifth CSSI tests. Control groups III (highly susceptible) and IV (moderately susceptible) received no treatment. Results showed that both treatment groups significantly improved performance on CSSI tests after training; neither of the control groups changed significantly. Highly and moderately susceptible subjects in the two treatment groups improved at comparable rates. Highly susceptible control group subjects did not habituate across tests as readily as the moderately susceptible controls. (Author)

**A82-47339** **Serum and urinary cation changes on acute induction to high altitude /3200 and 3771 metres/.** J. C. Chatterji, V. C. Ohri, K. S. Chadha, B. K. Das, M. Akhtar, S. C. Tewari, P. Bhattacharji, and A. Wadhwa (Ministry of Defence, Armed Forces Medical Services, New Delhi, India). *Aviation, Space, and Environmental Medicine*, vol. 53, June 1982, p. 576-579. 28 refs. Research supported by the Ministry of Defense.

Twenty subjects each were rapidly inducted by road to 3200 and 3771 m. Serum and urinary sodium, potassium, calcium, and magnesium were measured during 10 d at high altitude. At 3200 m, only serum potassium increased significantly on the 10th day. At 3771 m, serum potassium did not increase. Serum sodium generally remained low, serum magnesium increased, while calcium decreased significantly. Urinary volume over 24 h decreased more and for longer duration at 3771 m than at 3200 m. Urinary cations did not change significantly at 3200 m. At 3771 m, sodium and potassium excretion decreased on days 1 and 3 and later returned towards preinduction levels. Magnesium and calcium decreased throughout the high-altitude stay. Significant changes were noticed in serum and urinary cations on exposure to high altitude when adequate caloric intakes were not ensured. (Author)

**A82-47340** **Oxygen exposure and extrapulmonary respiratory tract ciliogenesis in adult male rats.** M. Heino (I Central Military Hospital, Helsinki, Finland) and L. A. Laitinen (Finnish Navy, Medical Office, Helsinki, Finland). *Aviation, Space, and Environmental Medicine*, vol. 53, June 1982, p. 580-582. 16 refs.

Adult male rats were exposed to pure oxygen at atmospheric pressure for 12 and 24 h. Electron microscopic examination indicated ciliogenesis at every respiratory tract level. For the first time this investigation has established an oxygen insult which affects the epithelium of the entire extrapulmonary respiratory tract, viz. ciliogenesis. An alteration in muco-ciliary clearance is suggested. (Author)

**A82-47341** **The effect of head cooling on deep body temperature and thermal comfort in man.** G. A. Brown and G. M. Williams (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Aviation, Space, and Environmental Medicine*, vol. 53, June 1982, p. 583-586. 11 refs.

A liquid conditioned hood made of stretch nylon was used to investigate the effect of head cooling on deep body temperature and thermal comfort in man. Six male subjects each performed two experiments of 2 h duration, in a climatic chamber in conditions of dry bulb temperature 40 C, wet bulb temperature 29 C and 50 mm black globe temperature 50 C. In one experiment head cooling was given during the first hour and in the other during the second hour. In both experiments, auditory canal (Tac) and oesophageal (Toe) temperatures increased during the first hour. During the second hour, without head cooling Tac and Toe continued to increase, while with head cooling no further increase in either was observed. The stabilization of deep body temperature was associated with an improvement in both head and body thermal comfort and with a small decrease in mean skin temperature. (Author)

**A82-47342** **Postexercise blood pressure as a predictor of hypertension.** R. Davidoff, C. L. Schamroth, A. P. Goldman, T. H. Diamond, A. J.

Cilliers, and D. P. Myburgh (Institute for Aviation Medicine, Pretoria, Republic of South Africa). *Aviation, Space, and Environmental Medicine*, vol. 53, June 1982, p. 591-594. 28 refs.

A study on 721 healthy male aircrew assessed whether the blood pressure response to exercise could be used to predict the development of hypertension. A positive blood pressure response to exercise, recorded 30 s after the completion of exercise, was defined as a systolic blood pressure of 200 torr or more (systolic test) or a raised diastolic blood pressure (diastolic test). While 236 (32.7%) became hypertensive with a blood pressure greater than 149/90 torr, 17% of these had shown a positive systolic response and 17% a positive diastolic response. The other 485 individuals (67.3%) remained normotensive throughout the mean follow-up period of 68 months (range 12-170 months). Of this group, 88% never manifested a positive systolic or diastolic response to exercise. Although 5% of the normotensive subjects manifested a positive systolic response to exercise, and 12% manifested a positive diastolic response to exercise, a longer period of follow-up may reduce this figure. It is concluded that exercise related blood pressure is a useful test in predicting the development of essential hypertension. (Author)

**A82-47376** **Maximal cardiac function in sedentary normal men and women - Comparison of age-related changes.** K. F. Hossack and R. A. Bruce (Washington, University, Seattle, WA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Oct. 1982, p. 799-804. 24 refs. Research supported by Marion Laboratories; Grants No. NIH-4-R01-HL-23404; No. NIH-RR-37.

**A82-47377** **Antidiuretic hormone responses to eucapnic and hypocapnic hypoxia in humans.** J. R. Claybaugh, C. E. Wade, A. K. Sato, S. A. Cucinell, J. C. Lane, and J. T. Maher (U.S. Army, Tripler Army Medical Center, Honolulu; U.S. Navy, Barbers Point Naval Air Station, HI; U.S. Army, Research Institute of Environmental Medicine, Natick, MA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Oct. 1982, p. 815-823. 29 refs.

The effect of hypobaric hypoxia on the urinary excretion rate of the antidiuretic hormone (ADH) was investigated in male volunteers. Results show that individuals acutely subjected to altitudes between 11,000 and 14,000 ft briefly increase ADH secretion during the first 24 hr of ascent, but this does not appear if alkalosis is prevented by increasing the atmospheric CO<sub>2</sub>. The physiological consequences of this increased ADH are also brief and do not affect the overall urinary flow rate during the first day at high altitude, nor does it appear to be a prerequisite in the development of acute mountain sickness. The ADH excretion rate is found to be normal or below sea-level values on the second day at high altitude. It is concluded that an increased urine flow resulting from both an increased sodium excretion and free water excretion typifies the normal asymptomatic response to high altitude and may be important in preventing high-altitude pulmonary edema. N.B.

**A82-47378** **Influence of exercise intensity and duration on biochemical adaptations in skeletal muscle.** G. A. Dudley, W. M. Abraham, and R. L. Terjung (New York, State University, Upstate Medical Center, Syracuse, NY). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Oct. 1982, p. 844-850. 32 refs. Grant No. NIH-AM-21617.

The influence of the intensity and daily duration of exercise on the concentration of cytochrome c in the three muscle fiber types was studied in rats that were treadmill trained for 8 weeks (5 days/week) by 1 of 19 different protocols. Results show that the general pattern of cytochrome c change, caused by increasing daily run times, follows a first-order relation for all fiber types. The intensity of running determined the final time-independent asymptotic values. In addition, by increasing the the running intensity, the length of daily run time required to reach the peak adaptive response was shortened. However, the intensity influence was very different between fiber types. In the fast-twitch red fiber, the maximal time-independent response at each work intensity was altered by exercise intensity at only submaximal work loads, while in the fast-twitch white fiber the adaptive response began at much lower levels of work load and it increased exponentially as intensity was increased. N.B.

**A82-47379** **Effect of short-term sleep loss on breathing.** K. R. Cooper (Virginia Commonwealth University, Richmond, VA) and B. A. Phillips (U.S. Veterans Administration Medical Center, Boston, MA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Oct. 1982, p. 855-858. 21 refs.

The effect of a single night of sleep loss on breathing was investigated by studying the ventilatory performance in 15 normal subjects. Spirometry and hypercapnic ventilatory response testing were conducted daily for 3 consecutive days and no sleep was permitted between testing on days 1 and 2. Results show a small but significant decline in the forced vital capacity and maximal voluntary ventilation, as well as a 20% decrease in hypercapnic ventilatory response slope, after sleep loss (P less than 0.05). It is concluded that sleep loss causes a significant deterioration in ventilatory performance, which may be clinically important to patients with respiratory diseases. N.B.

**A82-47380 Cerebrovascular responses to CO<sub>2</sub> after inhibition of sympathetic activity.** A. L. López de Pablo, M. C. González, G. Dieguez, B. Gómez, and S. Lluch (Madrid, Universidad Autónoma, Madrid, Spain). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Oct. 1982, p. 873-878. 29 refs. Research supported by the Comisión Asesora de Investigación Científica y Técnica and Ministerio de Sanidad.

The effects of the inhalation of 10 percent CO<sub>2</sub> in air on the cerebral blood flow and the cerebrovascular resistance were investigated in unanesthetized goats before and after impairment of the sympathetic activity present in cerebral vessels. Results show that the integrity of the perivascular sympathetic nerve endings is not an essential requirement for the appearance of cerebral vasodilation in hypercapnia, since reserpine treatment or denervation does not impede the increase in the cerebral blood flow consequent to hypercapnia. When the vessels are already dilated by pretreatment with reserpine or during the acute phase of ganglionectomy, the drop in cerebrovascular resistance in hypercapnia is found to be enhanced, compared with the response in control animals, because CO<sub>2</sub> exerts its effects on vessels in which the normal adrenergic tone has been partially or totally eliminated. In chronically denervated cerebral vessels the vascular tone is reestablished, and thus the cerebrovascular response to CO<sub>2</sub> is similar to that found in intact animals. N.B.

**A82-47381 Control of ventilation in climbers to extreme altitude.** R. B. Schoene (Washington, University, Seattle, WA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Oct. 1982, p. 886-890. 24 refs. Grants No. NIH-HL-05761; No. NIH-HL-00906.

The chemosensitivity of 14 climbers who had climbed to 7,470 m or higher, 10 age-matched controls, and 10 outstanding middle and long distance runners was studied in order to evaluate the association of blunted chemosensitivity with athletes of outstanding aerobic and endurance capabilities. Data for each individual's resting ventilation, hypoxic ventilatory response, and hypercapnic ventilatory response were collected and analyzed. Results show that the group of climbers had resting ventilatory parameters and ventilatory responses to hypoxia and hypercapnia when measured at sea level that were significantly greater than another group of successful athletes of similar endurance. The climbers had characteristics similar to the control group. It is concluded that successful climbers to extreme altitude may be selected by virtue of their vigorous respiratory responses to hypoxia to maintain adequate oxygenation in the presence of extreme environment hypoxia. N.B.

**A82-47382 Plasma prostaglandins, renin, and catecholamines at rest and during exercise in hypertensive humans.** P. Lijnen, R. Fagard, J. Staessen, and A. Amery (Leuven, Katholieke Universiteit, Louvain, Belgium). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Oct. 1982, p. 891-894. 27 refs. Research supported by the Institut pour l'Encouragement de la Recherche Scientifique dans l'Industrie et l'Agriculture.

**A82-47383 Effect of ventilatory drive on the perceived magnitude of added loads to breathing.** J. G. W. Burdon, K. J. Killian, and E. J. M. Campbell (McMaster University, Hamilton, Ontario, Canada). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Oct. 1982, p. 901-907. 13 refs. Research supported by the Medical Research Council of Canada.

Using open-magnitude scaling a study was conducted of the importance of ventilatory drive on the perceived magnitude of respiratory loads by applying a range of externally added resistances (2.1-77.1 cmH<sub>2</sub>O s/l) to normal subjects at rest and at three increasing levels of ventilatory drive induced by exercise, CO<sub>2</sub>-stimulated breathing, and hypoxia. Under all conditions studied the perceived magnitude of the added loads increased with the magnitude of the resistive load and as the underlying level of ventilatory drive increased. When the results were expressed in terms of peak inspiratory pressure, the perceived magnitude was related to the magnitude of the peak inspiratory pressure by a power function (mean  $r = 0.97$ ). These results suggest that the perceived magnitude of added resistive loads increased with increasing ventilatory drive, in such a manner that the increase in sensory magnitude is proportional to the increase in the inspiratory muscle force developed and suggests that something dependent on this force mediates the sensation. (Author)

**A82-47384 Right ventricular pressure response to +Gz acceleration stress.** J. E. Whinnery and M. H. Laughlin (USAF, School of Aerospace Medicine, Brooks AFB, TX). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Oct. 1982, p. 908-913. 30 refs.

The right ventricular pressure during Gz stress was measured in fully conscious miniature swine on a centrifuge at +Gz levels from +1 to +9. Results show that the maximum right ventricular systolic pressure observed during +Gz was 200 Torr at +5 Gz, and the maximum diastolic pressure, 88 Torr, was also found at this acceleration. Mean heart rates were 200-210 beats/min at all levels of +Gz greater than or equal to +3 Gz while the animal remained stable. Mean maximum right ventricular pressures increased during +Gz stress through +5 Gz (85 Torr) and decreased at higher levels of +Gz, which indicated that there is at least a

partial compensation during acceleration stress through +5 Gz. During acceleration above +5 Gz, decompensation in response to the stress began to occur, with all animals decompensating during +9 Gz. N.B.

**A82-47385 Cutaneous vascular response to exercise and acute hypoxia.** L. B. Rowell, P. R. Freund, and G. L. Brengelmann (Washington, University, Seattle, WA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Oct. 1982, p. 920-924. 27 refs. Grants No. NIH-HL-16910; No. NIH-RR-37.

The effect of hypoxia on the esophageal temperature-forearm skin blood flow relationship was studied in six normal young men during 50 min periods of moderate exercise, in which the work intensity was held constant to avoid the complications present in previous investigations. Results show that the forearm blood flow (FBF) rose throughout exercise and the esophageal temperature tended to stabilize in all subjects. No systematic changes in FBF or esophageal temperature or their relationship to each other were caused by 10 or 15 min periods of hypoxia. It is concluded that hypoxia equivalent to that incurred at 4,500-5,000 m does not significantly alter the short-term regulation of the forearm skin blood flow and body temperature during moderate exercise, and that net cutaneous vasoconstriction is not elicited by arterial chemoreflexes under these conditions. N.B.

**A82-47386 Effects of salicylate and 2,4-dinitrophenol on respiration and metabolism.** D. E. Millhorn, F. L. Eldridge, and T. G. Waldrop (North Carolina, University, Chapel Hill, NC). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Oct. 1982, p. 925-929. 17 refs. Research supported by the American Heart Association; Grants No. NIH-HL-17689; No. NIH-NS-11132; No. NIH-FR-05406.

The effects of uncouplers of oxidative phosphorylation (salicylate and 2,4-dinitrophenol) on metabolic and respiratory responses were investigated by studying the phrenic nerve responses in cats whose carotid sinus nerves and vagi had been cut and end-tidal pCO<sub>2</sub> and body temperature were servo-controlled. Results show that the magnitudes and time courses of the respiratory and metabolic responses to either agent were unrelated. It is concluded that these agents stimulate respiration by a mechanism other than one related to metabolic CO<sub>2</sub> production. N.B.

**A82-47387 Homogeneous nucleation of gas bubbles in vivo.** P. K. Weathersby, L. D. Homer, and E. T. Flynn (U.S. Naval Medical Research Institute, Bethesda, MD). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Oct. 1982, p. 940-946. 24 refs. Navy-supported research.

Several current theories of decompression sickness (DCS) presume the preexistence of gas bubble nuclei in tissue, because the de novo nucleation of gas bubbles in the body is thought to be theoretically impossible. Reexamination of nucleation theory reveals the overwhelming importance of two parameters: gas supersaturation and tissue surface tension ( $\gamma$ ). For the high  $\gamma$  of pure water nucleation theoretically requires more than 1,000 ATA supersaturation. Lower values of  $\gamma$  allow nucleation to occur with vastly smaller supersaturations. Application of homogeneous nucleation theory can provide reasonable fits to both rat and human pressure-reduction data with values of  $\gamma$  within the range reported for biological fluids (below 5 dyn/cm). The initial bubble sizes predicted are 0.1 micrometer or less. The presence of heterogeneous sites, for example crevices and lipid surfaces, makes nucleation even more likely. (Author)

**A82-47388 In vivo leucine oxidation at rest and during two intensities of exercise.** P. W. R. Lemon, F. J. Nagle, J. P. Mullin, and N. J. Benevenga (Wisconsin, University, Madison, WI). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Oct. 1982, p. 947-954. 42 refs. Research supported by the University of Wisconsin.

The in vivo oxidation of the branched chain amino acid leucine (Leu) was quantitatively determined in rats at rest and during two intensities of exercise by measuring their (C-14)O<sub>2</sub> production. Results show that Leu oxidation increases during exercise and that the increases may be related to the metabolic rate. The magnitude of these increases indicates that exercise of this type may increase the daily requirements of Leu and perhaps other indispensable amino acids. In addition, it is shown that the indirect noninvasive determination of (C-14)O<sub>2</sub> production provides an adequate estimate of Leu oxidation during exercise. N.B.

**A82-47389 Measurement of energy expenditure in humans by doubly labeled water method.** D. A. Schoeller and E. van Santen (Chicago, University, Chicago, IL). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Oct. 1982, p. 955-959. 20 refs. Grants No. NIH-AM-26678; No. NIH-AM-26678; No. NIH-AM-30031; No. NIH-RR-00055.

The utility of the doubly labeled water method for the determination of energy expenditure and water output was investigated in humans. Approximately 10 g of O-18 and 0.5 g of H-2 as water was orally administered to four healthy adults. Total body water was determined from the isotope dilution, and the ensuing O-18 and H-2 disappearance rates from body water were determined for 13 days by mass spectrometric isotope ratio analysis of the urinary water. During this period, subjects were maintained on a measured diet to determine energy and water

intake. The energy expenditure from the doubly labeled water method differed from dietary intake plus change in body composition by an average of 2%, with a coefficient of variation of 6%. The water outputs determined by the two methods differed by 1%, with a coefficient of variation of 7%. The doubly labeled water method is noninvasive, and the subjects could maintain their daily activities without restriction. (Author)

**A82-47390** Daily in vivo neuromuscular stimulation effects on immobilized rat hindlimb muscles. P. F. Gardiner and M. A. Lapointe (Montréal, Université, Montréal, Canada). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Oct. 1982, p. 960-966. 37 refs. Research supported by the Muscular Dystrophy Association and Natural Sciences and Engineering Research Council of Canada.

**A82-47391** Pulmonary function in normal humans with exercise and temperature-humidity stress. R. W. Stacy, E. Seal, Jr., J. Green, and D. House (U.S. Environmental Protection Agency, Health Effects Research Laboratory, Research Triangle Park; Rockwell International Environmental Monitoring and Services Center, Chapel Hill, NC). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Oct. 1982, p. 1015-1018. 13 refs.

The effect of exercise and temperature-humidity stresses on pulmonary function was studied in 58 young male human subjects who were exposed for 4 hr to comfortable conditions (22 C, 40% rh) or to heat stress conditions (30 C, 60% rh) with or without exercise. Results show that the exercise, estimated to use about two-thirds of the subjects' maximum oxygen intake, produced no statistically significant changes in pulmonary function parameters. Heat stress was found to produce significant changes in forced vital capacity, and possibly significant interactions were observed in peak expiratory flow and forced expiratory flow at 25% of vital capacity. In addition, the effects of the two factors appeared to be additive. It is concluded that the changes with exercise and heat stress are associated with reversals of a progressive decrease of airway resistance seen in subjects at rest in a comfortable environment. N.B.

**A82-47392** Evaluation of a method for estimating cardiac output from a single breath in humans. H. Chen, N. P. Silverton, and R. Hainsworth (Leeds University, Leeds, England). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 53, Oct. 1982, p. 1034-1038. 21 refs.

A modification has been developed for the single-breath method of Kim et al. (1966) for estimating cardiac output and arterial and mixed venous carbon dioxide tensions. The procedure was assessed in 30 normal and 22 cardiac patients. Results show that this modification of the single-breath method provides useful estimates of the arterial and mixed venous carbon dioxide tensions, and the cardiac output. It is concluded that although the method is simple for the subject, it is reliable provided only that the technique for delivery of the breath is standardized and the data are calculated as shown. N.B.

**A82-47575** † A method for the objective evaluation of vestibulo-cardiac reflexes (Metod ob'ektivnoi otsenki vestibulokardial'nykh refleksov). I. A. Skliut (Belorusskii Nauchno-Issledovatel'skii Institut Nevrologii, Neirokhirurgii i Fizioterapii, Belorussian SSR), V. I. Pivrikas (Nauchno-Issledovatel'skii Institut Fiziologii i Patologii Serdechno-Sosudistoi Sistemy, Palanga, Lithuanian SSR), and A. B. Zhukauskas (Klaipedskaia Bol'nitsa, Klaipeda, Lithuanian SSR). *Vestnik Otorinolaringologii*, Sept.-Oct. 1982, p. 9-13. 22 refs. In Russian.

A method is developed for investigating vestibulo-vegetative reactions by means of the caloric stimulation of the labyrinths and the computer analysis of electronystagmograms and rhythmograms. The statistical characteristics of the cardiac sinus rhythm and the nystagmographic parameters, which reflect certain aspects of the heart vegetative regulation and the degree of the vestibular system excitability, are utilized as criteria in this method. Increased dispersion and slow stabilization of the statistical parameters are found in patients with vegeto-vascular dystonia, which indicates a rise in the activity of the central vegetative unit when subjected to vestibular stimulation. A comparison of the nystagmographic and rhythmographic data enables favorable conditions to be chosen for the evaluation of the functional alterations of the heart, as well as the excitability of the vestibular system during their interaction, and also discloses several aspects of vegetative imbalance. This method provides an automated analysis of both electronystagmograms and rhythmograms by encompassing the major parameters without any preliminary processing. N.B.

**A82-47576** † Investigations of the vascular reactions or the nasal mucous membranes of cosmonauts (Issledovaniia sosudistykh reaktsii slizistoi obolochki nosa kosmonavtov). I. Ia. Iakovleva and V. P. Baranova (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Vestnik Otorinolaringologii*, Sept.-Oct. 1982, p. 44-46. 6 refs. In Russian.

Rhinopneumological examinations in three positions of the body were conducted on 36 cosmonauts 25-45 years of age, of whom 14 had participated in space flights of various durations. Standard nasal vascular responses were defined, and subjective characteristics of the nasal vascular reactions which occur during space flights were identified. Results of the examinations of cosmonauts

who had flown in space showed a rise in the intranasal resistance in the horizontal position of the body. These results allow the prediction of different degrees of nasal breathing disturbances due to vasomotor alterations of the nasal mucous membranes during periods of acute adaptation to weightlessness. N.B.

**A82-48201** † A model of the regulation of the blood glucose level during physical exercise (Model' regulatsii urovnia gliukozy v krovi pri fizicheskoi nagruzke). N. P. Kaimachnikov and E. I. Maevskii (Akademii Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Biofizika*, vol. 27, July-Aug. 1982, p. 698-702. 10 refs. In Russian.

A mathematical model is developed in order to study the dynamics of the blood glucose and lactate levels during physical exercise. The Cori cycle and the metabolism of glycogen in the liver and skeletal muscles are modeled, in which both the activation of liver gluconeogenesis and its inhibition due to a low pH as a result of high lactate concentrations are considered. The intensity of the physical exercise corresponds to the rate constants of muscle glycolysis. It is shown that during the increase in these constants the glucose level in the blood can increase at the expense of a decline in muscle glycolysis, as well as by an inhibition of gluconeogenesis or by an exhaustion of the supply of glycogen. The changes in the parameters of the model, which reflect training, promote the stability of glycemia and are in agreement with data in the literature. N.B.

**A82-48202** † A model for the restoration of the cellular composition of red blood (Model' vosstanovleniia kletchnogo sostava krasnoi krovi). V. E. Egarkin (Akademii Nauk SSSR, Institut Molekuliarnoi Biologii, Moscow, USSR). *Biofizika*, vol. 27, July-Aug. 1982, p. 694-697. 12 refs. In Russian.

A model is developed for the restoration of the normal composition of red blood after blood losses and the introduction of erythrocytes. It is shown that the system of equations, which describes the dynamics of the changes in the number of cells during chronic blood losses or other influences decreasing the mean life span of the cells, has an autooscillatory regime. The pattern of this regime is similar to the oscillations that are observed during the injection of iso-antibodies which destroy erythrocytes. N.B.

**A82-48203** † A model of monomeric tissue growth (Model' rosta odnomernoi tkani). K. E. Plokhotnikov (Gidrometeorologicheskii Nauchno-Issledovatel'skii Tsentr SSSR, Moscow, USSR). *Biofizika*, vol. 27, July-Aug. 1982, p. 689-693. 8 refs. In Russian.

A mathematical model of monomeric tissue growth and differentiation is developed. The equations for the growth of tissues are based on analogies with the Lagrange approach for the description of liquids. The factors responsible for the changing positions of the tissues in space and time are developed in terms of an activator-inhibitor. The equation system is analyzed for the existence of stationary solutions, which is interpreted as a property of tissue regeneration. In addition, the results of numerical analyses are presented. N.B.

**A82-48204** † An investigation of the ultrasound hemolysis of normal and pathological erythrocytes (Izucheniie ul'trazvukovogo gemoliza eritrotsitov v norme i pri patologii). F. I. Braginskaiia, G. G. Sultanova, V. B. Akopian, D. B. Korman, and K. E. Krugliakova (Akademii Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Biofizika*, vol. 27, July-Aug. 1982, p. 679-683. 8 refs. In Russian.

A method for the automatic registration of the kinetics of hemolysis by ultrasound is developed, and is used to differentiate normal individuals and those in whom tumors are present. The quantitative parameters which characterize the mechanical resistance of erythrocytes are investigated, including the time and rate of hemolysis, the time of half-destruction, and the percentage distribution of erythrocytes according to their hemolytic resistance, and it is found that they differ for erythrocytes in normal individuals and in those with tumors. It is shown that the mechanical resistance of erythrocytes increases in the presence of tumors as compared to normal individuals. An analysis of the curves of the differential distribution of erythrocytes according to their resistance to ultrasound reveals the accumulation of red blood cells whose membranes possess increased resistance. The effective constants for the rate of hemolysis by ultrasound for erythrocytes in suspension are calculated. N.B.

**A82-48205** † The effect of the dispersion of the electric parameters of bacterial cells on their orientation in an alternating electric field (Vliianie dispersii elektricheskikh parametrov bakterial'nykh kletok na ikh orientatsiiu v peremennom elektricheskom pole). V. M. Fomchenkov, A. L. Mazanov, and V. N. Brezgunov (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Prikladnoi Mikrobiologii, Serpukhov, USSR). *Biofizika*, vol. 27, July-Aug. 1982, p. 665-669. 15 refs. In Russian.

**A82-48206** † The effects of Li, Rb, and temperature on the binding of Na and K by glycerinated frog muscle fibers (Vliianie Li, Rb i temperatury na svyazivanie Na i K glitserinirovannymi myshechnymi voloknami lia-gushki). M. G. Grinfel'dt, E. A. Shapiro, and S. V. Levin (Akademii Nauk SSSR, Institut Tsitologii, Leningrad, USSR). *Biofizika*, vol. 27, July-Aug. 1982, p. 657-659. In Russian.

**A82-48207 †** The mechanism of the action of low intensity ultrasound on mitochondria (O mekhanizme deistviia ul'trazvuka nizkikh intensivnostei na mitokhondrii). V. A. Selivanov, V. P. Zinchenko, and A. P. Sarvazian (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Biofizika*, vol. 27, July-Aug. 1982, p. 653-656. 12 refs. In Russian.

**A82-48208 †** The use of phosphorescent probes in studies of model and biological membranes (Primenenie fosforescentnykh zondov dlia issledovaniia model'nykh i biologicheskikh membran). V. M. Mekler, A. I. Kotelnikov, G. I. Likhtenshtein, and M. A. Berkovich (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Chernogolovka; II Moskovskii Meditsinskii Institut, Moscow, USSR). *Biofizika*, vol. 27, July-Aug. 1982, p. 641-645. 13 refs. In Russian.

The use of phosphorescent probes for investigating membranes is evaluated using lecithin liposomes and rat liver microsomes. Results show that a ratio of one quencher molecule to 10,000 molecules of lecithin is adequate for the registration of diffusion-controlled quenching of erythrosine phosphorescence by stable nitroxide radicals. The use of quenchers of various polarities shows that the phosphorescent probe erythrosine is located in the region of the polar heads of phosphatidyl choline. The membrane microviscosity, as determined by the rate of the quenching of phosphorescence by radicals, equals approximately 0.1 (H) s/sq m at about 20 C. The coefficient of the lateral diffusion of erythrosine in liposomes, as estimated from their self-quenching, is equal to  $1.1 \times 10^{-8}$  to  $10^{-9}$  sq cm/sec. In the microsome, erythrosine is localized in the hydrophilic surface of proteins and is not accessible for the quencher molecules. N.B.

**A82-48209 †** The stability of a model with time lag, with the phytoplankton-phosphorus system considered as an example (Ustoichivost' modeli s zapadyvaniiem na primere 'Fitoplankton-Fosfor'). V. G. Il'ichev (Nauchno-Issledovatel'skii Institut Mekhaniki i Prikladnoi Matematiki, Rostov-on-Don, USSR). *Biofizika*, vol. 27, July-Aug. 1982, p. 703-706. 6 refs. In Russian.

**A82-48210 †** The regulation of equilibrium in humans on a small supporting surface (Regulatsiia ravnovesiia cheloveka na maloi opornoj poverkhnosti). E. T. Petrenko (Kazakhskii Institut Fizicheskoi Kul'tury, Alma-Ata, Kazakh SSR). *Biofizika*, vol. 27, July-Aug. 1982, p. 734, 735. In Russian.

The correlation spectral characteristics of a series of processes that reflect the regulation of equilibrium on extremely small supporting surfaces are investigated. The processes of regulation are found to intensify in demanding situations. The study is carried out on gymnasts, who perform exercises standing on one foot on a supporting surface of 170-190 sq cm and on tiptoe on a supporting surface of 28-32 sq cm. C.R.

**A82-48211 †** The elasticity of the foot during the modelling of human movement (Uprugost' stopy pri modelirovanii dvizhenii cheloveka). A. V. Zinkovskii and V. A. Chistiakov (Leningradskii Politehnicheskii Institut, Leningrad, USSR). *Biofizika*, vol. 27, July-Aug. 1982, p. 711-714. 9 refs. In Russian.

An anthropomorphic model is developed to estimate foot elasticity in human movements. In the model, the foot is presented as an elastic rod, and additional limitations on the zero point in support are introduced. The results of the model for a test jump are found to be similar to related movements in humans. N.B.

**A82-48212 †** The cause of zero drift in a visual polarimeter (O prichine dreifa nulevoi tochki vizual'nogo polarimetra). V. E. Zhvirblis. *Biofizika*, vol. 27, July-Aug. 1982, p. 744-747. 8 refs. In Russian.

It is shown that the 'fork' method proposed by Zhvirblis (1977) is essentially different from a procedure used by Burdin and Sizov (1981) for measuring the zero drift of a half-shade visual polarimeter. The fork method is based on an effect of biophysical nature, whereas the latter procedure involves a certain external physical influence on the device. V.L.

**A82-48213 †** The resistance and capacity function of the vessels of the small intestine and the filtration and absorption relations during short-term myocardial ischemia in cats (Rezistivnaia i emkostnaia funktsiia sosudov, tonkoi kishki, fil'tratsionno-absorbtsionnye otnosheniia pri kratkovremennoi ishemii miokarda u koshek). M. V. Enikeev (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Patologicheskaiia Fiziologii i Eksperimental'naia Terapiia*, July-Aug. 1982, p. 48-53. 17 refs. In Russian.

**A82-48214 †** Minor peptides under normal and pathological conditions (Malye peptidy v norme i pri patologii). I. P. Ashmarin (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Patologicheskaiia Fiziologii i Eksperimental'naia Terapiia*, July-Aug. 1982, p. 13-27. 99 refs. In Russian.

The paper surveys recent literature on the role of minor peptides as supracellular regulators under normal and pathological conditions, and their possible therapeutic use. Particular consideration is given to the diversity of opiate peptides, their functions, and possibilities of practical application; oligopeptides of memory and fragments of major peptides, stimulating learning; peptides combining neuroactivity and the function of immunity regulators; autoimmune diseases and the

pathology of brain peptide metabolism; and the central effect of a series of peptides in the brain tissue which previously were considered to be peripheral. B.J.

**A82-48215 †** The use of inosine during resuscitation for the prevention of post-resuscitation circulatory insufficiency (Primenenie inozina pri ozhivlenii dlia preduprezhdeniia postreanimatsionnoi nedostatochnosti krovoobrasheeniia). G. K. Boliakina and A. V. Volkov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Patologicheskaiia Fiziologii i Eksperimental'naia Terapiia*, July-Aug. 1982, p. 57-60. 11 refs. In Russian.

**A82-48216 †** The changes in the mechanical properties of the brain during the development of edema induced by repeated venous congestions (Izmeneniia mekhanicheskikh svoistv golovnogo mozga pri razvitiu oteka, vyzvannogo povtornym venoznym zastoeom). M. L. Itskis, G. I. Mchedlishvili, and N. I. Devdariani (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tbilisi, Georgian SSR). *Patologicheskaiia Fiziologii i Eksperimental'naia Terapiia*, July-Aug. 1982, p. 64-69. 12 refs. In Russian.

**A82-48217 †** A hereditary defect in the sensitivity to hypoxia during normal sensitivity to hypercapnia (Nasledstvennyi defekt chuvstvitel'nosti k ginoksii pri normal'noi chuvstvitel'nosti k giperkapii). T. V. Serebrovskaia (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian USSR). *Patologicheskaiia Fiziologii i Eksperimental'naia Terapiia*, July-Aug. 1982, p. 80-83. 12 refs. In Russian.

**A82-48218 †** Historico-epistemological analysis of the concept of 'tissue' (Istoriko-gnoseologicheskii analiz poniatia 'tkan'). A. A. Klishov. *Arkhir Anatomi, Gistologii i Embriologii*, vol. 83, July 1982, p. 74-93. 61 refs. In Russian.

The evolution of the concept of biological tissue in the course of the history of histology is discussed. Particular consideration is given to concept of tissue in the framework of cell theory, evolutionary histology, and modern histological theory. The possibility of the development of a fullfledged theory of tissue is examined. B.J.

**A82-48219 †** The ultrastructure of the inner medullary substance of the kidneys in several rodents in arid zones (Ul'trastruktura vnutrennego mozgovogo veshchestva pochki u nekotorykh gryzunov aridnoi zony). T. N. Getmanova (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR). *Arkhir Anatomi, Gistologii i Embriologii*, vol. 83, July 1982, p. 62-68. 9 refs. In Russian.

**A82-48220 †** The morphological characteristics of the terminal respiratory bronchioles and the arteries accompanying them during individually graded muscular activity (Morfologicheskaiia kharakteristika terminal'nykh, dykhatel'nykh bronkhioi i soprovozhdaushchikh ikh arterii pri individual'no dozirovannoi myshechnoi deiatel'nosti). A. I. Laptev (Gorkovskii Meditsinskii Institut, Gorki, USSR). *Arkhir Anatomi, Gistologii i Embriologii*, vol. 83, July 1982, p. 39-46. 23 refs. In Russian.

**A82-48221 †** The morphology of the submandibular lymph nodes of white rats during adaptation to high-altitude conditions (Morfologiiia podnizhnecheliustnykh limfaticheskikh uzlov belykh kpy, adaptiruushchikhsia k usloviyam vysokogoria). V. Sh. Belkin, M. Iu. Kuinova, and M. R. Sapin (Akademiia Nauk Tadzhikskoi SSR, Laboratoriia Vysokogornykh Mediko-Biologicheskikh Issledovani, Dyushambe, Tadzhik SSR; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Arkhir Anatomi, Gistologii i Embriologii*, vol. 83, July 1982, p. 33-39. 14 refs. In Russian.

Morphological data is presented for the changes in the cellular composition and in the main structural elements of the submandibular lymph nodes of white rats for 1, 3, 7, 14, 21, 30, and 50 days after lifting them to an altitude of 3,375 m above sea level. Results show that for up to 45 days no normalization of the cellular content is observed. The most consistent changes are found to be increases in the content of small lymphocytes in the light centers of the follicles, and decreases in the content of plasmocytes and dividing cells. Three stages are identified in the reaction of structural components of these lymph nodes during periods of adaptation to high-altitude hypoxia. N.B.

**A82-48222 †** The sequence of the pathomorphological reactions to the effect of an alternating magnetic field (Posledovatel'nost' patomorfologicheskikh reaktsii na deistvie peremennnykh magnitnykh polei). L. P. Soldatova (Tomskii Meditsinskii Institut, Tomsk, USSR). *Arkhir Anatomi, Gistologii i Embriologii*, vol. 83, July 1982, p. 12-15. 6 refs. In Russian.

The effects of 6.5 hr exposures (repeated 5 times) and of continuous 24 hr exposures to a magnetic field (20, 40, 70 mT, at a frequency of 50 Hz) on the neural elements of the parietal cortex in the brains of white rats are investigated by both electron and light microscopy. Results show that the pathomorphological changes depend on the length of the exposure to the magnetic field, and to a lesser extent depend on the strength of the field, and these changes are initially

observed in the communication system of the cortex. It is found that the walls of the cortical vessels and the filamentous astrocytes connected to them, as well as the dendrites and the spiculae, are the structures most affected by the field and are perhaps the first structures to participate in the reaction mechanism in response to the application of a magnetic field. Changes in the water-electrolyte balance are characterized by alterations in the microcirculatory bed of the cortex, the nerve cells, and the glial elements, which are evidently specific for the action of a magnetic field. N.B.

**A82-48223 † The structural-functional characteristics of the bush-like interoceptors in the initial period of anoxia (Strukturno-funktsional'naia kharakteristika kustikovidnykh interotseptorov v nachal'nom periode anoksii).** V. G. Lukashin, V. V. Vshivtseva, and N. A. Solov'ev (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Arkhiiv Anatomii, Gistologii i Embriologii*, vol. 83, July 1982, p. 5-12. 19 refs. In Russian.

The bush-like receptors of the *Rana temporaria* urinary bladder are studied by combined methods of electrophysiology, cytophotometry, and electron microscopy. Results demonstrate the phase character of the spontaneous impulse activity of the receptors in the urinary bladders of the frogs during the initial period of anoxia, the absence of differences in the size of the terminal plates in comparison with controls, as well as a rearrangement of their submicroscopic organization and the redistribution of organelles. It is suggested that these receptors possess a labile enzyme system which allows the metabolic level to be rapidly and significantly altered. N.B.

**A82-48225 EEG changes in sleep upon emotional stress.** E. G. Dincheva and N. N. Tsaneva (Meditsinska Akademiia, Sofia, Bulgaria). *Bolgarskaia Akademiia Nauk, Doklady*, vol. 35, no. 7, 1982, p. 993-996. 10 refs.

Medical students and parachutists were examined by EEG during sleep over a 15-day period of written examinations and parachute training to assay the effects of stress on sleep. The period of transition to sleep was found to be longer for the medical students. Statistically significant changes were observed in the paradoxical eye movement (PEM) sleep for both groups. The PEM decreased during nights before examinations and before parachute jumps. M.S.K.

**A82-48249 † Bioelectrochemical activity of the brain (Bioelektrokhimicheskaia aktivnost' golovnogo mozga).** T. B. Shvets-Teneta-Gurii. Moscow, Izdatel'stvo Nauka, 1980. 208 p. 384 refs. In Russian.

The work presents an experimental validation of a method for the investigation of brain metabolism on the basis of measurements of changes in the electrochemical potential of noble-metal (gold or platinum) electrodes implanted in the brain, this potential being determined by the chemical composition of the matter surrounding the electrodes. Information on the theoretical validation of this approach is systematized and generalized, and experimental results are presented on the dynamics of bioelectrochemical activity for various functional states and forms of activity of the brain. B.J.

**A82-48250 † Transmission of vibrations in the human extremities under vibrational loading (Rasprostranenie kolebanii v konechnostiakh cheloveka pri ikh vibratsionnom nagruzhenii).** M. V. Khvingia, A. M. Bagdova, A. S. Melia, and T. G. Tatishvili. Tbilisi, Izdatel'stvo Metsniereba, 1980. 112 p. 91 refs. In Russian.

Experimental and theoretical studies are presented on the excitation of vibrations in the human extremities. Experiments involved the excitation of steady-state and transient modes of vibration on vibration test stands, and the theoretical investigation involved analog simulation using multimass nonlinear mathematical models. Particular attention is given to vibration effects on workers who operate hand-held power tools. B.J.

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## STAR ENTRIES

**N82-32961\*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

### STS-3 MEDICAL REPORT

Sam L. Pool, ed., Philip C. Johnson, Jr., ed., and John A. Mason, ed. Aug. 1982 37 p refs

(NASA-TM-58247; S-517; NAS 1.15:58247) Avail: NTIS HC A03/MF A01 CSCL 06C

The medical operations report for STS-3, which includes a review of the health of the crew before, during, and immediately after the third Shuttle orbital flight is presented. Areas reviewed include: health evaluation, medical debriefing of crewmembers, health stabilization program, medical training, medical 'kit' carried in flight, tests and countermeasures for space motion sickness, cardiovascular profile, biochemistry and endocrinology results, hematology and immunology analyses, medical microbiology, food and nutrition, potable water, shuttle toxicology, radiological health, and cabin acoustic noise. Environmental effects of shuttle launch and landing medical information management, and management, planning, and implementation of the medical program are also discussed.

S.L.

**N82-32962#** Wisconsin Univ., Madison. Dept. of Chemical Engineering.

### PROPERTIES OF MULTIPHASE POLYURETHANE SYSTEMS Final Report, 1 Jul. 1981 - 30 Jun. 1982

Stuart L. Cooper Aug. 1982 37 p Sponsored by Navy

Avail: NTIS HC A03/MF A01

The synthesis and characterization of polyurethane anionomers was studied. The method used to prepare polyurethane anionomers was to sulfonate the urethane nitrogen via a bimolecular nucleophilic displacement. Polyurethane anionomers were prepared from conventional polyether polyurethanes ET-20 and ET-38. ET-20 is an MDI/PTMO (1000) copolymer exhibiting a single phase morphology containing 20 wt% MDI. ET-38 (38 wt% MDI) is an MDI/BD/PTMO polyurethane of molar ratios 3/2/1 demonstrating a well phase separated morphology. Each of these polymers were sulfonated to several different levels. The coordination of sodium sulfonate with the polymer hard segments or soft segments was investigated and the alteration of physical properties which occur upon anionization was explained. The experimental techniques employed include gel permeation chromatography, infrared spectroscopy, differential scanning calorimetry, dynamic mechanical testing, and stress-strain analysis.

S.L.

**N82-32963\*#** Temple Univ., Philadelphia, Pa.

### THE INFLUENCE OF VARIED GRAVITO-INERTIAL FIELDS ON THE CARDIAC RESPONSE OF ORB-WEAVING SPIDERS Annual Report

Alfred Finck Aug. 1982 59 p refs

(Grant NAGw-242)

(NASA-CR-169314; NAS 1.26:169314)

Avail: NTIS

HC A04/MF A01 CSCL 06C

The Gz transfer function was described for the orb weaving spider *A. sericatus*. The functional relationship between the heartrate and the intensity of G is linear in the form of:  $Y = a \text{ Log } Gz - 1 + k$ . The heartrate in unrestrained animals was recorded by a laser plethysmograph developed specifically for this purpose. Following a control, sample heartrate were taken postrotation between 1.001 and 1.5 Gz in 6 steps. The underlying distribution of heartrates does not appear significantly different from a Gaussian distribution. A method of varnishing the legs of the spider was developed. This was done in order to compromise the lyriform

organs, especially those located on the patellae. The lyriform organ is hypothesized to serve the receptor role in the transduction of gravity related stimuli. In preliminary animals the Gz function, post varnishing of the patellae, appears to be changed in the direction of poorer discrimination. We also observed that the resting heartrate following the varnish procedure is substantially increased. S.L.

**N82-32964#** Letterman Army Inst. of Research, San Francisco, Calif. Electron Microscopy Group.

### CORNEAL ENDOTHELIUM AFTER INFRARED LASER EXPOSURE. EVALUATION OF TECHNIQUES TO STUDY CORNEAL LESIONS Final Report, 1975 - 1982

S. Schuschereba, B. Stuck, and P. Shawaluk Jun. 1982 19 p refs

(AD-A116748; LAIR-123) Avail: NTIS HC A02/MF A01 CSCL 06/3

Specimens of corneal endothelium of adult rhesus monkeys were evaluated for alterations by one of three staining techniques. One cornea from each animal was exposed to carbon dioxide laser radiation and removed surgically 2 hours after exposure. The other eye of each of the 18 monkeys served as controls. Each control cornea was stained with the same as the matching specimen. All specimens were processed for histologic examination by embedding in Epon. The combined use of TB and TNBT staining procedures allows detection of subtle alterations of the corneal endothelium at irradiances as low as 25 watts/sq cm of CO<sub>2</sub> laser (10.6 micrometers) radiation for a 100 msec exposure. Enzyme activity is induced at irradiances from 35 to 65 watts/sq cm, which causes progressive increase in the incidence of altered cellular viability. The application of the combined techniques allows a better description of the response of the corneal endothelium to infrared laser radiation and its dose dependence. GRA

**N82-32965#** Armed Forces Radiobiology Research Inst., Bethesda, Md. Behavioral Sciences Dept.

### BEHAVIORAL STUDIES FOLLOWING IONIZING RADIATION EXPOSURES: A DATA BASE

C. G. Franz, R. W. Young, and W. E. Mitchell Aug. 1981 94 p refs

(AD-A115825; AFRR-TR-81-4) Avail: NTIS HC A05/MF A01 CSCL 09/2

Data concerning the effects of ionizing radiation on primate performance are the basis for current radiation combat casualty criteria. The data were consolidated into a computerized data base. Potential users are provided with the background and details necessary to access the data base and to retrieve information from it. The search parameters for the data base are defined, and the sources, extent, and reliability of data contained in the data set are discussed.

Author

**N82-32966#** Oak Ridge National Lab., Tenn. Health and Safety Research Div.

### INVESTIGATION OF CORRELATIONS BETWEEN CHEMICAL PARAMETERS OF METAL IONS AND ACUTE TOXICITY IN MICE AND DROSOPHILA

J. E. Turner, E. H. Lee, K. Bruce Jacobson, Nelwyn T. Christie (Tennessee Univ., Oak Ridge), M. W. Williams, and James D. Hoeschele 1981 21 p refs Presented at the 21st Hanford Life Sci. Symp. on Biol. Availability of Trace Metals, Richland, Va., 4 Oct. 1981

(Contract W-7405-eng-26)

(DE82-001451; CONF-811035-2) Avail: NTIS HC A02/MF A01

The correlations between physicochemical properties associated with metal ions and their observed toxicity was studied. One approach employs chemical concepts of hard and soft acids and bases. A set of LD50 values for acute toxicity in mice for 24 metal ions was obtained under uniform conditions. With these new data, a better correlation between LD50 and Pearson's softness parameter  $\delta_{\text{sub } p/}$  is obtained. It is suggested that better correlations might exist for parameters more relevant to biological systems. From a wide range of parameters, not necessarily limited to ions of a given charge as is  $\delta_{\text{sub } p/}$ , it was found that the electrode potential gives as good a correlation as  $\delta_{\text{sub } p/}$ . DOE

**N82-32967#** Oak Ridge National Lab., Tenn. Health and Safety Research Div.

**ENHANCED BENZO[A]PYRENE METABOLISM IN HAMSTER EMBRYONIC CELLS EXPOSED IN CULTURE TO FOSSIL-SYNFUEL PRODUCTS**

D. D. Schuresko, G. D. Griffin, M. C. MacLeod, and J. K. Selkirk 1981 7 p refs Presented at the 6th Symp. on Polycyclic Aromatic Hydrocarbons, Columbus, Ohio, 27 Oct. 1981

(Contract W-7405-eng-26)

(DE82-002904; CONF-811086-3) Avail: NTIS HC A02/MF A01

The enzyme aryl hydrocarbon mono-oxygenase (AHM) is involved in the initial metabolism of polynuclear aromatic (PNA) compounds to excretable polar derivatives. The utilization of AHM induction as a biochemical indicator of exposure to PNA's is investigated in cultured mammalian cells exposed to fossil synfuel materials. DOE

**N82-32968#** Washington State Univ., Pullman. Dept. of Agronomy and Soils.

**LACK OF INDUCTION OF SINGLE-STRAND BREAKS IN MAMMALIAN CELLS BY SODIUM AZIDE AND ITS PROXIMAL MUTAGEN**

P. Arenaz (Temple Univ., Philadelphia), R. A. Nilan, and A. Kleinhofs 1981 19 p refs

(Contracts DE-AT06-76EV-72002; DE-AM06-76RL-02221)

(DE82-001721; DOE/EV-72002/56; DOE/RL-02221/56) Avail: NTIS HC A02/MF A01

The effect of azide and its proximal mutagen (mutagenic metabolite) on single strand breaks was investigated and the potential hazard of azide exposure to man was evaluated. Chinese hamster V79 cells were treated with either azide or its proximal mutagen(s) for 2 h or 6 h respectively and analyzed by alkaline elution for single strand breaks. It is shown that there is no effect of either azide or the proximal mutagen(s) on single strand DNA breaks nor is there any indication that azide or the proximal mutagen(s) induced DNA protein crosslinks. It is suggested that neither azide nor its proximal mutagen(s) interact directly with DNA and that the methods may be applied to any specified population and dose scenario. DOE

**N82-32969#** Paris VII (France). Inst. de Recherche en Biologie Moleculaire.

**[ACTIVITIES OF THE INSTITUTE FOR RESEARCH IN MOLECULAR BIOLOGY] Annual Report, 1980/81 [INSTITUT DE RECHERCHE EN BIOLOGIE MOLECULAIRE: RAPPORT D'ACTIVITE, ANNEES 1980-1981]**

1981 315 p refs In FRENCH

Avail: NTIS HC A14/MF A01

Work in the fields of microbiology, molecular genetics, cellular and molecular differentiation, cellular genetics and immunology, and in developmental biochemistry is reported. Complemented and current projects are described and results are presented.

Author (ESA)

**N82-32970** Defence Research Information Centre, Orpington (England).

**TOXICOLOGICAL TESTS ON TRIFLUOROMONOBROMOMETHANE**

J. Scholz and W. Weigand Jun. 1982 13 p refs Transl. into ENGLISH from Zentralblatt fuer Arbeitsmed. u. Arbeitsschutz (West Ger.), 1964 pp 129-131

(DRIC-T-6663; BR83701) Copyright. Avail: Issuing Activity

Freon 13 B 1 inhalation tests are summarized. After a single 2hr exposure, no behavioral changes in rats and guinea pigs, even at a concentration of 60% by volume, are reported. In long-term experiments, rats, guinea pigs, dogs and cats were exposed for a total of 70 hr to a 20% by volume (200,000 ppm concentration) of freon 13 B 1. During the experiment, the animals exhibited no behavioral changes. Histological examination indicates no pathological changes in the organs. Employees in production and filling plants, who worked for many years in a moderate freon atmosphere suffer no health damage as a result. Author (ESA)

**N82-32971\*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

**DUAL PHYSIOLOGICAL RATE MEASUREMENT INSTRUMENT Patent Application**

Tommy Cooper, inventor (to NASA) (Narco Scientific, Houston, Tex.) Filed 1 Jul. 1982 12 p Sponsored by NASA (NASA-Case-MSC-20078-1; US-Patent-Appl-SN-394343) Avail: NTIS HC A02/MF A01 CSCL 06B

An instrument for converting a physiological pulse rate into a corresponding linear output voltage is described. The instrument, which accurately measures the rate of an unknown rectangular pulse wave over an extended range of values, comprises a phase-locked loop including a phase comparator, a filtering network, and a voltage-controlled oscillator, arranged in cascade. The phase comparator has a first input responsive to the pulse wave and a second input responsive to the output signal of the voltage-controlled oscillator. The comparator provides a signal dependent on the difference in phase and frequency between the signals appearing on the first and second inputs. A high-input impedance amplifier accepts an output from the filtering network and provides an amplified output DC signal to a utilization device for providing measurement of the rate of the pulse wave. NASA

**N82-32972\*#** Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.

**CLINICAL OPHTHALMIC ULTRASOUND IMPROVEMENTS Final Report**

J. B. Garrison and P. A. Piro Aug. 1981 33 p refs

(Contracts NAS5-26085; N00024-81-C-5301)

(NASA-CR-170432; NAS 1.26:170432) Avail: NTIS HC A03/MF A01 CSCL 06E

The use of digital synthetic aperture techniques to obtain high resolution ultrasound images of eye and orbit was proposed. The parameters of the switched array configuration to reduce data collection time to a few milliseconds to avoid eye motion problems in the eye itself were established. An assessment of the effects of eye motion on the performance of the system was obtained. The principles of synthetic techniques are discussed. Likely applications are considered. Author

**N82-32973#** Bolt, Beranek, and Newman, Inc., Los Angeles, Calif. Office of Environment and Energy.

**POSSIBILITY OF HEARING LOSS FROM EXPOSURE TO INTERIOR AIRCRAFT NOISE Final Report**

Karl S. Pearsons and John F. Wilby Nov. 1981 80 p refs

(Contract DTFA01-80-C-1046)

(AD-A116504; FAA-AEE-81-15) Avail: NTIS HC A05/MF A01 CSCL 01/2

This report reviews criteria for hearing damage developed by the Committee on Hearing, Bioacoustics and Biomechanics (CHABA) of the National Academy of Science. It presents noise levels occurring in narrow and wide body commercial aircraft, business jet aircraft and short takeoff and landing (STOL) aircraft. It presents estimates of time exposure for pilots and crews based on FAA permitted flight times. It also provides estimations of possible hearing damage resulting from different exposures to interior noise of various aircraft types. Author (GRA)

**N82-32974#** Johns Hopkins Univ., Baltimore, Md. Dept. of Psychiatry.

**SUSTAINED BLOOD PRESSURE RESPONDING DURING SYNTHETIC WORK**

R. L. Ray and Henry H. Emurian 15 Jun. 1982 34 p refs

(Contract N00014-80-C-0467; NR Proj. 170-910)

(AD-A115733; ONR-TR-5) Avail: NTIS HC A03/MF A01 CSCL 06/5

In Experiment I, hour-long elevations in men blood pressure were elicited by the performance of a synthetic work task for both naive subjects and experienced subjects. Task-elicited changes in heart rate failed to reach significance although split-half reliabilities of both heart rate and mean blood pressure were high during task performance. Significant correlations were observed between performance effectiveness and cardiovascular response magnitude that differed in sign between experienced

and naive groups. These data indicated the utility of the synthetic task for the study of sustained blood-pressure elevations elicited by work performance. In Experiment II, task-elicited blood pressure, heart rate, and respiration rate were reliably and persistently elicited during five five-minute trials for two consecutive daily sessions. Blood pressure response magnitude declined slightly over trials for both sessions, and this diminution in magnitude was attributable to a gradual rise in baseline levels. Examination of trial-by-trial data and the between-session correlations for baseline and response magnitude values suggests that task-elicited blood pressure and heart rate responses, and to a lesser extent respiration rate responses, constitute a highly stable system which changes slowly, if at all, with practice. Author (GRA)

**N82-32975#** San Francisco Univ., Calif. Inst. of Chemical Biology.

**SURVEY OF TOXICITY AND CARCINOGENICITY OF MINERAL DEPOSITS Final Report**

Arthur Furst and Ingeborg Harding-Barlow 3 Nov. 1981 101 p (Contract W-7405-eng-48)

(DE82-003164; UCRL-15413) Avail: NTIS HC A06/MF A01

The toxicities and biogeochemical cycles of arsenic, cadmium, chromium, lead and nickel are reviewed in some detail, and other trace elements briefly mentioned. These heavy metals are used as a framework within which the problem of low level radioactive waste disposal can be compared. DOE

**N82-32976#** Environmental Protection Agency, Washington, D.C. Office of Noise Abatement and Control.

**FIVE-YEAR RESEARCH PLAN FOR EFFECTS OF NOISE ON HEALTH**

Dec. 1981 196 p

(PB82-168972; EPA-550/9-82-101)

Avail: NTIS

HC A09/MF A01 CSCL 06F

Categories of health effects of noise and priorities for any new research are presented: nonauditory physiologic effects, particularly, cardiovascular effects; sleep disturbance; individual and community response; noise induced hearing loss behavioral, social and performance effects; and communication interference. The research priorities, and results of recent research to arrive at a detailed plan including Multi-Component Research Initiatives are discussed. GRA

**N82-32977#** National Bureau of Standards, Washington, D.C.

**X-RAY MEASUREMENTS AND PROTECTION, 1913-1964: THE ROLE OF THE NATIONAL BUREAU OF STANDARDS AND THE NATIONAL RADIOLOGICAL ORGANIZATIONS Final Report**

Lauriston S. Taylor Dec. 1981 390 p refs

(PB82-165036; NBS-SP-625; LC-81-600158)

Avail: NTIS

HC A17/MF A01 CSCL 06R

A single source record of significant committee papers, correspondence, and decisions during the period 1913 to 1964, along with a summary of National Bureau of Standards work, and the interrelated efforts of many others in the scientific community is documented. A complete listing of the published output of the National Bureau of Standards' radiation staff is also included. The papers contribute significantly to the understanding of ionizing radiation. GRA

**N82-32978#** Colorado Univ., Boulder. Dept. of Psychology.

**THE ROLE OF TEMPORAL OVERLAP OF VISUAL AND AUDITORY MATERIAL IN DUAL MEDIA COMPREHENSION**

Patricia Baggett Apr. 1982 28 p refs

(Contract N00014-78-C-0433; NR Proj. 157-422)

(AD-A115714; ONR-113) Avail: NTIS HC A03/MF A01 CSCL 05/10

The forming of associations between the visuals and spoken material in a dual media presentation such as film or television are discussed. The role of the overlap in time of visual and auditory linguistic material is outlined. A 30 min. film which introduces an assembly kit, its pieces, their names, and some of their uses was shown. The film's visuals and narration was either presented in synchrony or could be shifted to the other up to 21 sec. Subjects saw the film in one of seven versions. It is found that the temporal

order in which visual and auditory elements are presented influences the formation of dual media associations and that when auditory precedes visuals, much of the auditory component is lost. E.A.K.

**N82-32979#** Honeywell, Inc., Minneapolis, Minn. Systems and Research Div.

**VISUAL SEARCH: CLUTTER AND PROXIMITY EFFECTS Final Technical Report**

John R. Bloomfield, Jerry Wald, and Laura A. Thompson 1979 57 p refs

(Contract DAAK70-79-C-0032)

(AD-A115799) Avail: NTIS HC A04/MF A01 CSCL 17/8

The objective of the experimental program proposed in this report is to explore clutter and texture effects and to determine their usefulness as camouflage aids. Several perceptual experiments were conducted. The data from them can be used to help characterize the relation between a military target and its detectability in complex backgrounds. Such work in perception is a necessary step toward the development of camouflage standards for the prime visual threat. GRA

**N82-32980#** Air Force Human Resources Lab., Brooks AFB, Tex. Logistics and Technical Training Div.

**ADVANCED INSTRUCTIONAL SYSTEM: APPLICATIONS FOR THE FUTURE**

William A. Nunns Jul. 1982 11 p Presented at the Sci. and Eng. Symp., Wright-Patterson AFB, Ohio, 27-29 Oct. 1981

(AF Proj. 1121)

(AD-A117144; AFHRL-TP-81-45) Avail: NTIS HC A02/MF A01 CSCL 05/9

The Advanced Instructional System (AIS) was developed as a prototype computer-based training system to demonstrate the feasibility of administering and managing individualized instruction on a large scale. A secondary, but major, function of the AIS was to provide a research and development capability for evaluation of instructional innovations. Throughout the AIS development effort, there was a continual evolution in computer technology applicable to the instructional process. At the completion of development in 1977, the AIS incorporated state-of-the-art instructional techniques, media, and computer hardware and software. Since completion of the formal development phase, several major capabilities have been added to the system to support other Laboratory research efforts. What has evolved is a system that, in addition to supporting the full range of computer-based instructional functions, has capabilities to support flight scheduling, information retrieval, and materials development. As a result of several technology demonstrations conducted jointly by the Air Force Human Resources Laboratory (AFHRL) and the Major Commands, the Tactical Air Command (TAC), Strategic Air Command (SAC), and Military Airlift Command (MAC) have identified applications where implementation of this technology would improve their operational effectiveness and efficiency. These implementations could well be where the full benefit of the AIS technology to the Air Force would be realized. GRA

**N82-32981#** Forschungsinstitut fuer Anthropotechnik, Bonn (West Germany).

**STUDIES OF PLANNING BEHAVIOR OF AIRCRAFT PILOTS IN NORMAL, ABNORMAL AND EMERGENCY SITUATIONS**

G. Johannsen, W. B. Rouse, and K. Hillmann Dec. 1981 92 p refs

(Grants NSG-2119; NAG-2-123)

(NASA-CR-169319; NAS 1.26:169319; FB-53) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 10 CSCL 05I

A methodology for the study of planning is presented and the results of applying the methodology within two experimental investigations of planning behavior of aircraft pilots in normal, abnormal, and emergency situations are discussed. Beyond showing that the methodology yields consistent results, these experiments also lead to concepts in terms of a dichotomy between event driven and time driven planning, subtle effects of automation

on planning, and the relationship of planning to workload and flight performance. Author (ESA)

**N82-32982#** Research Inst. of National Defence, Stockholm (Sweden).

**DISTANCE ESTIMATION IN PROJECTED PHOTOGRAPHS**

Henry Widen Apr. 1982 11 p refs  
(FOA-C-56031-H2) Avail: NTIS HC A02/MF A01

Outdoor estimation of large distances, and estimation of the same distances in projected photographs was studied. Subjects made meter estimations of seven distances ranging from 205 to 1070 m, and other subjects estimated the same distances in photographs. The visual angles were the same in the two conditions, the viewing distance in the photograph condition was 150 cm. Progressively larger underestimation of distance in both conditions are shown. Standard deviations are large, and increase as a function of true distance. Analysis of variance shows no significant difference between photograph and outdoor conditions. It is concluded that it is possible to simulate terrain with photographs in experiments where parameters such as visibility must be controlled. Author (ESA)

**N82-32983#** European Space Agency, Paris (France).

**CHANGES IN PSYCHOMETRIC COEFFICIENTS AND FACTOR STRUCTURE DUE TO PRACTICING PERFORMANCE TESTS**

Klaus-Martin Goeters Dec. 1981 147 p refs Transl. into ENGLISH of "Die Aenderung der psychometrischen Kennwerte u. der Faktorenstruktur als Folge der Uebung von Tests" rept. DFVLR-FB-80-15 DFVLR, Bonn, Apr. 1980 152 p  
(ESA-TT-686; DFVLR-FB-80-15) Avail: NTIS HC A01/MF A01; original German report available from DFVLR, Cologne DM 30,50

Practice effects on psychological test data were studied, using literature data and results from experiments. Analysis shows that improvement in performance associated with practice is expressed as a change in the mean which is associated with a change in variance in the same direction. There can be a systematic increase in results, depending on the scale, (e.g., using the number of correct answers as the measurement) or a systematic decrease (e.g., using solution times). Coefficients of variation remain substantially constant. In every case, the reliabilities increase. It is shown that the specific factor based on the Fleishman paradigm is not a practice factor in the sense of being a new factorial variance. This factor is probably a methodological artifact as the test variance remains substantially homogeneous with practice. Author (ESA)

**N82-32984#** Forschungsinstitut fuer Anthropotechnik, Bonn (West Germany).

**COMPARATIVE EVALUATION OF METHODS FOR THE MEASUREMENT OF MENTAL WORKLOAD DURING A SIMPLE SIMULATED CAR DRIVING TASK [VERGLEICHENDE BEWERTUNG VON METHODEN ZUR MESSUNG DER MENTALEN BEANSPRUCHUNG BEI EINER VEREINFACHTEN SIMULIERTEN KFZ-FUEHRUNGSFABE]**

C. Pfendler Oct. 1981 88 p refs In GERMAN; ENGLISH summary  
(FB-51) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 10

A graphic rating scale, a secondary task mean cardiac interval time, and four measures of heart rate variability were used to assess mental workload in a simulated car driving task and were compared on the basis of reliability and validity. The difficulty of the car driving task was varied in three levels by changing the cutoff frequency of the forcing function. Tracking error in the simulated car driving task significantly increases with higher difficulty levels. Graphic rating scale scores also increase significantly with primary task difficulty levels. Internal consistency of the rating scale is satisfactory. Secondary task error as a measure has a retest reliability good for group comparisons, but not for individual comparisons. Its validity as workload indicator is lower than that of the rating scale. Of all workload assessment procedures used, cardiac measures have the highest retest reliabilities. The validity of the cardiac variables as workload indicators is low. Only

one measure of heart rate variability differentiates approximately along with the secondary task scores. Author (ESA)

**N82-32985\*#** National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Tex.

**HEAT RESISTANT PROTECTIVE HAND COVERING Patent Application**

Richard P. Tschirsh (Little (Arthur D.), Inc., Cambridge, Mass.), Kenneth R. Sidman (Little (Arthur D.), Inc., Cambridge, Mass.), and Irving J. Arms, inventors (to NASA) (Little (Arthur D.), Inc., Cambridge, Mass.) Filed 30 Jun. 1982 16 p Sponsored by NASA  
(NASA-Case-MS-C-20261-1; US-Patent-Appl-SN-393586) Avail: NTIS HC A02/MF A01 CSCL 06Q

A heat-resistant, protective glove having a shell made of a fabric of a temperature-resistant aromatic polyamide fiber is described. The outer surface of the shell is coated with a five-resistant elastomers and a liner, generally conforming and secured to the shell and disposed inwardly of the shell, the liner being made of a felt fabric of temperature-resistant aromatic polyamide fiber. NASA

**N82-32986\*#** National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Tex.

**HEAT RESISTANT PROTECTIVE HAND COVERING Patent Application**

Richard P. Tschirsh (Little (Arthur D.), Inc., Cambridge, Mass.), Kenneth R. Sidman (Little (Arthur D.), Inc., Cambridge, Mass.), and Irving J. Arms, inventors (to NASA) (Little (Arthur D.), Inc., Cambridge, Mass.) Filed 30 Jun. 1982 17 p Sponsored by NASA  
(NASA-Case-MS-C-20261-2; US-Patent-Appl-SN-393581) Avail: NTIS HC A02/MF A01 CSCL 06Q

A heat-resistant protective glove having first and second shells which generally define the palm and back sides of the glove is described. The shell sections are made of a temperature-resistant aromatic polyamide fiber; the first, a twill weave and the second, a knitted fabric. The first liner has a flame-resistant, elastomeric coating on a surface contiguous to the inner surface of the first shell section. A second liner is located inwardly of the second shell section. The liner sections are comprised of a temperature-resistant aromatic polyamide fiber felt fabric. NASA

**N82-32987\*#** San Jose State Univ., Calif. Dept. of Chemistry. **MINERAL SEPARATION AND RECYCLE IN A CONTROLLED ECOLOGICAL LIFE SUPPORT SYSTEM (CELSS)**

E. Vernon Ballou Mar. 1982 56 p refs  
(Contract NCC2-53)  
(NASA-CR-166388; NAS 1.26:166388; CELSS-18) Avail: NTIS HC A04/MF A01 CSCL 06K

The background of the mineral nutrition needs of plants are examined along with the applicability of mineral control and separation to a controlled ecological life support system (CELSS). Steps that may be taken in a program to analytically define and experimentally test key mineral control concepts in the nutritional and waste processing loops of a CELSS are delineated. J.M.S.

**N82-32988\*#** Georgia Inst. of Tech., Atlanta. School of Nuclear Engineering and Health Physics.

**PREPARATION AND ANALYSIS OF STANDARDIZED WASTE SAMPLES FOR CONTROLLED ECOLOGICAL LIFE SUPPORT SYSTEMS (CELSS)**

John L. Carden and Richard Browner Aug. 1982 30 p refs  
(Contract NCA2-OR260-102)  
(NASA-CR-166392; NAS 1.26:166392; CELSS-20) Avail: NTIS HC A03/MF A01 CSCL 06K

The preparation and analysis of standardized waste samples for controlled ecological life support systems (CELSS) are considered. Analysis of samples from wet oxidation experiments, the development of ion chromatographic techniques utilizing conventional high pressure liquid chromatography (HPLC) equipment, and an investigation of techniques for interfacing an ion chromatograph (IC) with an inductively coupled plasma optical emission spectrometer (ICPOES) are discussed. Author

**N82-32989\*** # Life Systems, Inc., Cleveland, Ohio.

**PREPROTOTYPE NITROGEN SUPPLY SUBSYSTEM DEVELOPMENT Contractor Final Report**

D. B. Heppner, J. H. Fort, and F. H. Schubert Jun. 1982 100 p refs

(NASA-CR-166379; NAS 1.26:166379) Avail: NTIS HC A05/MF A01 CSCL 06K

The design and development of a test stand for the Nitrogen Generation Module (NGM) and a series of tests which verified its operation and performance capability are described. Over 900 hours of parametric testing were achieved. The results from this testing were then used to design an advanced NGM and a self contained, preprototype Nitrogen Supply Subsystem. The NGM consists of three major components: nitrogen generation module, pressure controller and hydrazine storage tank and ancillary components. The most important improvement is the elimination of all sealing surfaces, achieved with a total welded or brazed construction. Additionally, performance was improved by increasing hydrogen separating capability by 20% with no increase in overall packaging size. Author

**N82-32990#** Air Force Systems Command, Brooks AFB, Tex. Applications and Liaison Office.

**PROGRAMS IN EDUCATION AND TRAINING OF MANPOWER AND PERSONNEL, INCLUDING LOGISTICS AND GROUP ASPECTS OF HUMAN FACTORS ENGINEERING Final Annual Report, fiscal year 1981**

Ruth M. Buescher Jun. 1982 160 p

(AF Proj. 9981)

(AD-A116275; AFHRL-TP-82-27) Avail: NTIS HC A08/MF A01 CSCL 05/1

The Air Force Human Resources Laboratory (AFHRL) mission, corporate philosophy, and descriptions of its research and development (R&D) thrusts are presented. Fiscal Year 1981 technical achievements and ongoing R&D are organized under each thrust area. AFHRL organizational structure, the functions of its divisions and staff offices, available technical resources, and publications and presentations by Laboratory personnel during Fiscal Year 1981 are included. Author

**N82-32991#** Federal Aviation Administration, Washington, D.C. **A SYSTEMS ENGINEERING EVALUATION METHOD FOR PILOTED AIRCRAFT AND OTHER MAN-OPERATED VEHICLES AND MACHINES. APPENDIX D: A UNIFYING SET OF HYPOTHESES FOR DYNAMIC SYSTEM TEST AND EVALUATION; THE RATING AND MEASUREMENT OF SYSTEM PERFORMANCE, SYSTEM LOAD, AND SYSTEM WORK AND THEIR INTERRELATIONSHIPS Final Report**

Thomas H. Higgins 27 Apr. 1982 15 p refs

(AD-A115601; FAA-RD-81-30-ADD) Avail: NTIS HC A02/MF A01 CSCL 05/8

A set of equations, definitions, symbols, units of measurement and an equal interval scale providing an equal interval unit rating and measurement method for system evaluation are presented. The objective is to provide a unified approach to the systems engineering evaluation, rating and measurement of a dynamic system. The equations present the hypothesized relationships between system ratings and system measures of performance, work, and load. An equal interval, one-tenth power of ten, scale with ten as the highest rating is introduced for the rating, measuring, and communicating system performance, work, and load factors. These factors are of increasing interest during early R&D system dynamic simulation concept testing and later operational system test and evaluation. Author (GRA)

**N82-32992#** Naval Air Development Center, Warminster, Pa. **DEVELOPMENT OF THE HELICOPTER CREWMAN JACKET Final Report**

Jules Z. Lewycky Jan. 1982 54 p refs

(AD-A115635; NADC-82122-60) Avail: NTIS HC A03/MF A01 CSCL 06/17

This jacket, to be worn by Helicopter Mobile Crewmen or Helicopter passengers, provides for insulation and flotation to a wearer forced into cold water. It consists of an outer fire resistant

aramid shell, a vest-like bladder attached to the shell and a layer of insulation. This bladder can be inflated thru a CO2 inflation device by a pull on a beaded handle. It can also be inflated orally. When inflated, the jacket will keep the wearer face-up in the water. GRA

**N82-32993#** Perceptronics, Inc., Woodland Hills, Calif.

**AN EXPERIMENTAL EVALUATION OF TACTICAL SYMBOL-DESIGN FEATURES Annual Technical Report, 16 Mar. 1979 - 15 Mar. 1980**

Michael G. Samet, Ralph E. Geiselman, and Betty M. Landee 1 Apr. 1980 69 p refs

(Contract DAHC19-78-C-0018; DA Proj. 2Q7-62722-A-765)

(AD-A115895; PATR-1063-80-4-2; ARI-TR-498) Avail: NTIS HC A04/MF A01 CSCL 05/10

Sixteen non-military participants learned each of two symbol sets (conventional, iconic) to a criterion. Each set contained three basic symbols representing unit types of armor, mechanized infantry, and infantry. After learning a symbol set, each participant was shown a series of situation displays, where some displays contained symbols coded with either perimeter-density or vector projection to convey supplementary unit-attribute information (unit strength or firepower reach) needed for typical tactical tasks. For each display, the participant was asked questions corresponding to different behavioral processes (identification, search, comparison, pattern recognition). Overall, the results suggested that iconic symbols may not necessarily be preferable to conventional symbols in certain situations; and, although the portrayal of supplemental unit information can slow some aspects of information processing, certain symbol-design features appear to create less interference than others. In a supplementary task which required integration of information from several symbols into an analytical judgment (threat value assessment), performance accuracy was found to be insensitive to the conventional versus iconic symbolology comparison. The results were discussed in terms of the complexity of the implications involved in the selection of symbol design features and their correspondence with tactical concepts. GRA

**N82-32994#** Geo-Centers, Inc., Newton, Mass.

**SAFETY ANALYSIS FOR NAVAL LIQUID OXYGEN LIFE SUPPORT SYSTEM**

May 1982 37 p refs

(Contract N00014-81-C-2307)

(AD-A115742; GC-TR-82-220) Avail: NTIS HC A03/MF A01 CSCL 06/11

This research effort has examined both the generic hazards of the use of liquid oxygen (LOX) in a closed (submarine) environment and specific concerns relative to a current candidate design. In the generic analysis, more than 200 accidents involving LOX were investigated, and a chart showing the distribution of identifiable cases is shown in figure 1. This analysis identified the four most common causes, in descending order of frequency, as follows: contamination of LOX system with hydrocarbons, operator error, improper maintenance, and an unknown. The large number of cases in the unknown category reflects the often catastrophic nature of a LOX accident in which much of the evidence is destroyed. A similar analysis, conducted by Zabetakis, (3) identified a similar array of causes: mechanical failure of cryogenic components due to low temperature fatigue or component freeze-up, reaction of LOX with the containment vessel or auxiliary equipment, reaction of LOX with a contaminant, failure of safety devices, and operator error. GRA

**N82-32995#** California Univ., San Diego. Center for Human Information Processing.

**FIVE PAPERS ON HUMAN-MACHINE INTERACTION**

Donald A. Norman May 1982 37 p refs Sponsored in part by AFOSR

(Contract N00014-79-C-0323; NR Proj. 157-437)

(AD-A116031; CHIP-112; ONR-8205) Avail: NTIS HC A03/MF A01 CSCL 05/8

This report consists of five brief papers on different aspects of human-machine interaction. The first paper, 'Some Observations

on Mental Models,' discusses the role of a person's mental model in the interaction with systems. The second paper, 'A Psychologist Views Human Processing: Human Errors and other Phenomena Suggest Processing Mechanisms' discusses the differences between conventional digital processing structures (the Von Neumann machine) and the mechanism of the human. The third paper, 'Steps toward a Cognitive Engineering,' shows how analysis of error can lead to design principles. The fourth paper, 'The Trouble with UNIX,' is an informal critique of the UNIX operating systems. The final paper, 'The Trouble with Networks,' describes some of the computer interactions that resulted from the distribution of the fourth paper. Author (GRA)

**N82-33979\*#** Texas Univ., Houston. Dept. of Physiology and Cell Biology.

**INSULIN RESISTANCE FOR GLUCOSE METABOLISM IN DISUSED SOLEUS MUSCLE OF MICE Progress Report**

Michael J. Seider, William F. Nicholson, and Frank W. Booth  
28 Sep. 1981 14 p refs  
(Contract NAS9-169353; Grant AM-1-9393)  
(NASA-CR-169353; NAS 1.26:169353) Avail: NTIS  
HC A02/MF A01 CSCL 06C

Results of this study on mice provide the first direct evidence of insulin resistance for glucose metabolism in skeletal muscle that has undergone a previous period of reduced muscle usage. This lack of responsiveness to insulin developed in one day and in the presence of hypoinsulinemia. Future studies will utilize the model of hindlimb immobilization to determine the causes of these changes. L.F.M.

**N82-33980#** Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).

**TECHNIQUE FOR THE AEROBIC CULTIVATION OF MICRO-ORGANISMS IN WATER-IN-OIL EMULSIONS**

1982 15 p Transl. into ENGLISH of East German Patent No. 141393 (1980)  
(NRC/CNR-TT-2031; ISSN-0077-5606) Avail: NTIS  
HC A02/MF A01

A technique for cultivating microorganisms in water in oil emulsions, particularly at high cell concentrations is described. Fermentation is facilitated in a reversed phase at technically and economically necessary cell concentrations. A stable water in oil emulsion is ensured at high cell concentrations by adding suitable substances to the fermentation medium. The formation of a stable reversed phase in the fermentation medium occurs when special additives are used. S.L.

**N82-33981\*#** National Aeronautics and Space Administration, Langley Research Center, Hampton, Va.

**AN ASSESSMENT OF PERT AS A TECHNIQUE FOR SCHEDULE PLANNING AND CONTROL**

Charles W. Sibbers Jul. 1982 21 p  
(NASA-TM-83265; NAS 1.15:83265) Avail: NTIS  
HC A02/MF A01 CSCL 05A

The PERT technique including the types of reports which can be computer generated using the NASA/LaRC PPARS System is described. An assessment is made of the effectiveness of PERT on various types of efforts as well as for specific purposes, namely, schedule planning, schedule analysis, schedule control, monitoring contractor schedule performance, and management reporting. This assessment is based primarily on the author's knowledge of the usage of PERT by NASA/LaRC personnel since the early 1960's. Both strengths and weaknesses of the technique for various applications are discussed. It is intended to serve as a reference guide for personnel performing project planning and control functions and technical personnel whose responsibilities either include schedule planning and control or require a general knowledge of the subject. Author

**N82-33982\*#** Tufts Univ., Medford, Mass. Dept. of Physics.  
**VISCOSITY DEPENDENCE OF THE RATES OF DIFFUSIONAL PROCESSES**

David L. Weaver Moffett Field, Calif. NASA. Ames Research

Center Aug. 1982 13 p refs

(Contract NCA2-OR785-210)

(NASA-CR-166394; NAS 1.26:166394) Avail: NTIS  
HC A02/MF A01 CSCL 06C

It is shown that the rates of diffusion-controlled processes may have a solvent viscosity independent part as well as a viscosity dependent part. Some relevant experiments involving intramolecular polypeptide movements are discussed, and implications for some experiments on diffusion in membranes are outlined. Author

**N82-33983\*#** National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

**STIMULATION OF BODY WEIGHT INCREASE AND EPIPHYSEAL CARTILAGE GROWTH BY INSULIN LIKE GROWTH FACTOR**

S. Ellis Sep. 1981 15 p refs  
(NASA-TM-84285; A-9059; NAS 1.15:84285) Avail: NTIS  
HC A02/MF A01 CSCL 06P

The ability of insulin-like growth factor (IGF) to induce growth in hypophysectomized immature rats was tested by continuous infusion of the partially purified factor at daily doses of 6, 21, and 46 mU for an 8-day period. A dose-dependent growth of the proximal epiphyseal cartilage of the tibia and an associated stimulation of the primary spongiosa were produced by these amounts of IGF. The two highest doses of IGF also resulted in dose-dependent increases of body weight. Gel permeation of the sera at neutrality showed that the large-molecular-weight IGF binding protein was not induced by the infusion of IGF, whereas it was generated in the sera of hypophysectomized rats that were infused with daily doses of 86 mU of human growth hormone. Author

**N82-33984#** Army Research Inst. of Environmental Medicine, Natick, Mass.

**RESPIRATORY ADAPTATION TO ACUTE METABOLIC ACIDOSIS IN GOATS WITH ABLATED CAROTID BODIES**

R. A. Steinbrook, S. Havaheiri, R. A. Gabel, J. C. Donovan, and D. E. Leith 6 Mar. 1982 26 p refs  
(DA Proj. 3E1-61102-BS-10)

(AD-A116657; USARIEM-M-34/82) Avail: NTIS  
HC A03/MF A01 CSCL 06/19

In awake goats before and after ablation of carotid bodies (CBx) we studied the effect of acute metabolic acidosis (AMA) produced by intravenous infusion of HCl on resting pulmonary ventilation, on composition of arterial blood and CSF, and on ventilatory responsiveness to hyperoxic CO<sub>2</sub> rebreathing. The AMA caused decrease in PaCO<sub>2</sub> (breathing air at rest) and shifted the position of CO<sub>2</sub> response curves toward lower values of PCO<sub>2</sub>. These changes were similar before and after CBx, though the levels of PCO<sub>2</sub> in arterial blood during air breathing, and in expired gas at a given level of ventilation during CO<sub>2</sub> rebreathing were higher after CBx. We conclude that a respiratory adaptation to AMA does occur in goats deprived of peripheral chemoreceptors, and is probably mediated by the central chemoreceptors. Author (GRA)

**N82-33985#** Army Armament Research and Development Command, Aberdeen Proving Ground, Md. Chemical Systems Lab.

**AN APPARATUS FOR THE MEASUREMENT OF PULMONARY FUNCTION IN UNANESTHETIZED SMALL ANIMALS Technical Report, Jun. 1979 - Jun. 1980**

R. L. Farrand Apr. 1982 17 p refs

(DA Proj. 1L1-62706-A-553)

(AD-A114938; AD-E410545; ARCSL-TR-81094) Avail: NTIS  
HC A02/MF A01 CSCL 06/3

Because of public and political opinion, rising costs, and regulations, the use of some types of laboratory animals has been limited. As a result, small mammals - in particular, white rats - have become an acceptable alternative to canines for use in toxicological testing. In this report, a method is described by which unanesthetized and comfortably restrained rats are exposed by inhalation to yield fairly complete pulmonary information. GRA

**N82-33986#** Battelle Memorial Inst., Richland, Wash.  
**DOSIMETRIC AND BEHAVIORAL ANALYSIS OF MICROWAVE-DRUG SYNERGISTIC EFFECTS ON OPERANT BEHAVIOR IN THE RAT** Final Report, Sep. 1979 - Dec. 1981

Richard H. Lovely, David L. Lundstrom, and Richard D. Phillips  
 18 Dec. 1981 26 p refs

(Contract N00014-79-C-0819)

(AD-A115115) Avail: NTIS HC A03/MF A01 CSCL 06/15

Five male Long-Evans rats, maintained at 80% of their free-feeding weight, were trained to bar-press for food reward on a one-minute fixed-interval (FI1) schedule of reinforcement. Once stable FI1 baseline response rates were established, dose-response functions were generated for Chlordiazepoxide HCl (CDZ). Subsequent treatments with CDZ were followed by 30 min. pulsed microwave radiation (MWR) and FI1 behavioral assessment. Pulsed MWR exposures were in the far zone of an anechoic chamber at an averaged incident power density of 1 mW/sq cm (PRF = 300/sec, 3 usec pulse width). After 2 replications of the combined treatments another CDZ dose-response function was generated. This was followed by 3 more CDZ and MWR replications the first of which was carried out at an averaged incident power density of 1 mW/sq cm. Increased rates of response for the CDZ and 1 mW/sq cm MWR treatment were demonstrated relative to initial CDZ dose-response functions in 4 of 5 rats tested. However, the dose-response functions for CDZ alone, that were generated following this apparent synergy showed the same shift in response rate. Further, the 8 mW/sq cm 2 pulsed MWR combined with CDZ also produced data similar to the 1 mW/sq cm post-MWR exposure CDZ dose-response functions for the animals tested. Thus, we were unable to replicate an earlier demonstration of synergy between CDZ and MWR. GRA

**N82-33987#** Hawaii Univ., Honolulu.  
**FIVE OTEC BIOFOULING AND CORROSION EXPERIMENTS AT KEAHOLE POINT, 1976 TO 1980**

F. C. Munchmeyer, L. R. Berger, and B. E. Liebert Nov. 1981  
 120 p refs

(Contract W-31-109-eng-38)

(DE82-008086; ANL/OTEC-BCM-026) Avail: NTIS  
 HC A06/MF A01

The effects of biological fouling and corrosion on the seawater side of a heat exchanger tube were evaluated. Sites and field apparatus, heat transfer, water quality, biology and corrosion aspects of the OTEC experiments are discussed. Six candidate tube materials were exposed during the experiments and preliminary answers to corrosion questions were found. It is found that (1) 5052 aluminum tubes did not pit, and (2) that their rate of corrosion was slow enough to suggest a 30 year design life when the tubes are cleaned with a bristle brush. DOE

**N82-33988#** Joint Publications Research Service, Arlington, Va.  
**USSR REPORT: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES**

15 Sep. 1982 145 p refs Transl. into ENGLISH from various Russian articles

(JPRS-81775) Avail: NTIS HC A07/MF A01

Studies in life sciences, biomedical sciences, and behavioral sciences are reported. The following fields of interest were studied: agricultural biology, biochemistry, biotechnology, environment effects, medical demography, medicine, microbiology, physiology, radiation biology, and human factors engineering.

**N82-33989#** Joint Publications Research Service, Arlington, Va.  
**NEW DATA ON METABOLISM AND ACTION MECHANISM OF MYCOTOXINS**

V. A. Tutelyan and L. V. Kravchenko In its USSR Rept.: Life Sci., No. 20 (JPRS-81775) 15 Sep. 1982 p 10-23 refs Transl. into ENGLISH from Vestnik Akad. Med. Nauk SSSR (Moscow), no. 1, Jan. 1981 p 88-95

Avail: NTIS HC A07/MF A01

The discovery of a large number of mycotoxins which are secondary metabolites of mold fungi that contaminate foods and

feed is discussed. The health hazard to man and animals by mycotoxins increased attention given to the problem. More than 240 strains of different species of microscopic fungi were isolated, which produce about 100 toxic compounds which are considered to alimentary mycotoxicosis in man and animals. It is shown that the mycotoxins affect the different stages of protein and nucleic acid biosynthesis. E.A.K.

**N82-33990#** Joint Publications Research Service, Arlington, Va.  
**DESIGN OF AUTOMATED SYSTEMS FOR CONTROL OF TECHNOLOGICAL PROCESSES IN LARGE SCALE MICROBIOLOGICAL INDUSTRY WITH USE OF MICROPROCESSORS**

Aleksandr Alekseyevich Oprishko, Artem Vartanovich Babayants, Valentin Pavlovich Davydov, Yuriy Grigoryevich Kolpikov, and Yakov Asaipovich Khanukayev In its USSR Rept.: Life Sci., No. 20 (JPRS-81775) 15 Sep. 1982 p 33-37 refs Transl. into ENGLISH from Upralyayushchiye Sistemy I Mashiny (Kiev), no. 6, Nov. - Dec. 1981 p 133-136

Copyright. Avail: NTIS HC A07/MF A01

The stable trend toward increase in capacity per unit of technological equipment and intensification of technological processes, which are currently observed are attributed to economic factors which contribute to the development of this production. Changes were made to systems that are partially or entirely decentralized in management structure. Advances in semiconductor technology, which enabled ASUTP developers to use new hardware based on microprocessors enabled the change over. It is found that microprocessor equipment meets the requirements of decentralized control systems. E.A.K.

**N82-33991#** Joint Publications Research Service, Arlington, Va.  
**BIOELECTRIC FIELDS: THEIR SOURCES, NATURE AND PURPOSE**

V. R. Protasov and O. A. Serdyuk In its USSR Rept.: Life Sci., No. 20 (JPRS-81775) 15 Sep. 1982 p 68-89 refs Transl. into ENGLISH from Usp. Sovrem. Biol. (Moscow), v. 93, no. 2, Mar. - Apr. 1982 p 270-286

Avail: NTIS HC A07/MF A01

The possible mechanisms of effects of weak electric fields on processes of growth, development and regeneration are discussed. The role of these fields on the cellular, tissular, organismic and population levels is examined. It is concluded that bioelectric fields are an objective reality, an inalienable feature of all that lives. Moreover, electric activity of cells and tissues is used more than once in evolution of different systems. High speed conduction of electric impulses developed on its basis; an entire group of fish developed the amazing capacity to generate and perceive strong electric fields and use them in different areas of their activity. It is assumed that bioelectric fields are involved in processes of morphogenesis, growth and regeneration, as well as nerveless transmission of information within multicellular organisms. E.A.K.

**N82-33992#** Joint Publications Research Service, Arlington, Va.  
**EFFECT OF LOCAL VIBRATION ON DIVERS WORKING UNDER WATER**

A. V. Sterlikov, F. P. Lakhov, and A. K. Belukhin In its USSR Rept.: Life Sci., No. 20 (JPRS-81775) 15 Sep. 1982 p 90-93 refs Transl. into ENGLISH from Gig. Tr. Prof. Zabol., (Moscow), no. 11, Nov. 1981 p 32-35

Copyright. Avail: NTIS HC A07/MF A01

Trained divers, who performed underwater work on the basis of their physical condition were studied. Construction of underwater gas and oil lines, dams and moorage, involves considerable work by divers working in ventilated gear. Pick hammers, pneumatic drills and other vibrating tools are used often in underwater work. Divers make use mainly of low frequency vibrating tools. The conditions under which man is exposed to local vibration under water are very different from those on the ground, due to the presence of a number of aggravating factors: cooling of the working limb and entire body, elevation of partial oxygen tension, compression and intensive noise. It is recommended that the hygienic specifications for the diver's work tool according to level of vibration it generates. Our objective here was to study the effect of local

vibration generated by a tool on a diver during work, determined of physiological changes and dynamics of recovery thereof. E.A.K.

**N82-33993#** Joint Publications Research Service, Arlington, Va.  
**STRUCTURAL CHANGES IN PLASMA MEMBRANE UNDER INFLUENCE OF IONIZING RADIATION**

B. S. Fomenko and I. G. Akoyev *In its* USSR Rept.: Life Sci., No. 20 (JPRS-81775) 15 Sep. 1982 p 97-115 refs Transl. into ENGLISH from Ups. Sovrem. Biol. (Moscow), v. 93, no. 2, Mar. - Apr. 1982 p 183-195

Avail: NTIS HC A07/MF A01

The effects ionizing radiation on membranes was studied. Changes arising in the oligosaccharide layer of the surface of the cell membrane, in the protein and lipid phases of membranes under the influence of radiation, as well as possible schemes of formation of structural changes in the membrane are discussed. Molecular bases of structural membrane changes induced by radiation, and determination of their role in development of cell pathology were investigated. The influence of the state of irradiated cell membranes on their radiosensitivity are also studied. E.A.K.

**N82-33994#** Joint Publications Research Service, Arlington, Va.  
**EFFECTS OF COMBINATION OF ANTIBIOTIC-RESISTANT BIFIDOBACTERIA AND CORRESPONDING ANTIBIOTICS OF SURVIVAL OF IRRADIATED MICE**

V. M. Korshunov, B. V. Pinegin, N. P. Ivanova, and V. N. Maltsev *In its* USSR Rept.: Life Sci., No. 20 (JPRS-81775) 15 Sep. 1982 p 116-121 refs Transl. into ENGLISH from Z. Mikrobiol., Epidemiol. I Immunol. (Moscow), no. 5, May 1982 p 50-53

Avail: NTIS HC A07/MF A01

Elimination of intestinal dysbacteriosis in irradiated animals by combining antibiotics and preparations of bifidobacteria resistant to these antibiotics prolonging the life of these animals was investigated. Broad spectrum antibiotics are used to treat intestinal dysbacteriosis. Bifidobacterial preparations are used to restore the microbial cenosis and their administration is started after antibiotics are discontinued. There are some flaws to deferred administration of bifidobacteria, since the process of colonization of the intestine with commercial bifidobacterial preparations is rather lengthy, and there is slow elevation of bifidobacterium level in the intestinal tract, whereas exogenous recontamination of the intestine by conditionally pathogenic bacteria is possible after antibiotic therapy is discontinued. Use of antibiotics along could be the cause of intestinal dysbacteriosis. E.A.K.

**N82-33995\*#** National Aeronautics and Space Administration, Washington, D. C.  
**AEROSPACE MEDICINE AND BIOLOGY. A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 235, AUGUST 1982**

Aug. 1982 71 p  
(NASA-SP-7011(235); NAS 1.21:7011(235)) Avail: NTIS HC \$7.00 CSCL 06E

This bibliography lists 201 reports, articles and other documents introduced into the NASA Scientific and Technical Information system in July 1982. Author

**N82-33996\*** National Aeronautics and Space Administration, Pasadena Office, Calif.  
**HYPERTHERMIA HEATING APPARATUS Patent**

Paul M. Gammell, inventor (to-NASA) Issued 31 Aug. 1982 8 p Filed 13 May 1980

(NASA-Case-NPO-14549-2; US-Patent-4,346,715; US-Patent-Appl-SN-149526; US-Patent-Appl-SN-918705; US-Patent-Class-128-422; US-Patent-Class-128-784; US-Patent-Class-128-804) Avail: US Patent and Trademark Office CSCL 06B

Electromagnetic energy is delivered to a localized area of a patient's body in a hyperthermic treatment so that it provides a uniform distribution of electromagnetic flux lines within the localized area of the patient's body and produces a uniform and localized

heating gradient. An electrode array includes a number of electrodes which are arranged in pair, with the electrodes in each pair being spaced a particular distance apart. The array is driven by a balanced line system which is electromagnetically coupled to each pair of electrodes and which is shielded by a ground coaxial shield which itself is ground to the body of the patient. Each electrode is embedded in a Teflon stand-off in order to move the region of strong field, from the body, produced by rapidly changing potentials. The two pairs of electrodes forming a cross-like geometry are used with the balanced line systems. The electrical power is either multiplexed among the electrodes or the second pair is driven by a potential which is sinusoidal and which is 90% out of phase with the first balanced line system which is also sinusoidal.

Official Gazette of the U.S. Patent and Trademark Office

**N82-33997** Marquette Univ., Milwaukee, Wis.  
**THE EFFECT OF DISUSE ON FAST AND SLOW SKELETAL MUSCLE Ph.D. Thesis**

Frank Arthur Witzmann 1981 134 p  
Avail: Univ. Microfilms Order No. 203783

It is well established that the motor activity pattern regulates physiological and molecular processes in mammalian skeletal muscle. Adaptations to disuse have been extensively studied, but observations of contractile function have yielded conflicting results. The present study was therefore undertaken to characterize the disuse-mediated alterations in both isometric and isotonic contractile properties and selected biochemical parameters in the slow, type I, soleus (SOL); the fast, type IIA and B, extensor digitorum longus (EDL); and the fast, type IIB, superficial vastus lateralis (SVL) muscles. Judging from the present findings, it is apparent that the tonically active SOL atrophies to a greater extent than the fast EDL and SVL following hindlimb casting. The preferential effect is evident in both morphological and contractile properties. It is important, however, to point out that despite preferential type I atrophy, the present data fail to substantiate fiber type switching or the notion that fast muscles are somehow unaffected by disuse. Dissert. Abstr.

**N82-33998** State Univ. of New York, Buffalo.  
**INFLUENCE OF THE DIVING RESPONSE AND SUBMERSION ON THE BREATH-HOLDING TIME IN MAN Ph.D. Thesis**

John A. Sterba 1981 170 p  
Avail: Univ. Microfilms Order No. 8204124

The aim of this investigation was to determine if the diving response increases the voluntary breath-holding (BH) time in man. The diving response consists of reductions in heart rate (bradycardia) and peripheral blood flow induced by cold-water face immersion and BH. Five subjects with the strongest diving bradycardia response were selected from 32 SCUBA divers who were screened with a cold-water face immersion BH test. The maximal BH time and BH time to the first 'urge-to-breathe' were used to assess the changes in BH ability induced by the diving response. Cardiac stroke volume was measured by impedance cardiography and peripheral flow by venous occlusion plethysmography. In conclusion, while cold-water face immersion induced a pronounced diving response, this response is of no obvious biological value in man since there were no effects on gas exchange and BH time. The marked prolongation of BH time during thermal-neutral submersion may increase the danger for a BH diver to lose consciousness due to hypoxia. Dissert. Abstr.

**N82-33999** California Univ., Davis.  
**MECHANISMS OF CHANGE IN PLASMA VOLUME TO ACUTE AND CHRONIC EXERCISE IN MAN Ph.D. Thesis**

Victor Anthony Convertino 1981 198 p  
Avail: Univ. Microfilms Order No. 8200499

To investigate the time course and mechanism(s) of the increase in (BV) during endurance exercise training (ET), blood hematocrit, hemoglobin, and plasma volume (PV, T-1824), osmotic (Osm), electrolyte, renin activity (PRA), arginine vasopressin (AVP), and protein fractions were measured in venous blood taken from 15 men during rest and three graded work intensities on a cycle ergometer, and during ET for 2 hr/day for 8 consecutive

days at 65% of their maximal oxygen uptake ( $VO_2$  max.). The data suggest that during acute exercise, plasma hyperosmolality, produced by net hypotonic plasma efflux, stimulates AVP release, while stimulation of the renin angiotensin system responds primarily to increased sympathetic activity. During repeated exposures, plasma expansion was associated with accumulative acute elevations in PRA and AVP that facilitate  $Na(+)$  and water retention and a progressive increase in plasma protein content that provides increased water binding capacity for the blood. Dissert. Abstr.

**N82-34000** State Univ. of New York, Brooklyn.  
**SOME COMPUTER APPLICATIONS AND DIGITAL IMAGE PROCESSING IN NUCLEAR MEDICINE** Ph.D. Thesis

Thomas Lowinger 1981 147 p  
 Avail: Univ. Microfilms Order DA8203258

Methods of digital image processing are applied to problems in nuclear medicine imaging. The symmetry properties of central nervous system lesions are exploited in an attempt to determine the three dimensional radioisotope density distribution within the lesions. An algorithm developed by astronomers at the end of the 19th century to determine the distribution of matter in globular clusters is applied to tumors. This algorithm permits the emission computed tomographic reconstruction of spherical lesions from a single view. Images of phantoms acquired by a scintillation camera interfaced to a computer were analyzed. Both pinhole and parallel hole collimator equipped camera acquired images were studied. The three dimensional radioisotope distribution derived by the application of the algorithm can be used to characterize the lesions. The applicability to nuclear medicine images of ten edge detection methods in general usage in digital image processing were evaluated in terms of three criteria: (1) Receiver operating characteristic curves (ROC analysis); (2) Ability to preserve area; (3) Ability to preserve shape. Phantoms and clinical images were studied as a function of information density (ID). Dissert. Abstr.

**N82-34001\*** National Aeronautics and Space Administration, Washington, D. C.

**MISSION OPERATION REPORT. SPACE SHUTTLE PROGRAM: STS-4 POSTFLIGHT MEDICAL OPERATIONS REPORT**

20 Aug. 1982 23 p  
 (NASA-TM-84854; E-989-81-04; NAS 1.15:84854) Avail: NTIS HC A02/MF A01 CSDL 06P

The OFT program was evaluated and demonstrates under progressively demanding conditions the safe ascent, on-orbit operations, and return of the Orbiter and crew. A variety of scientific payloads from industry, other government agencies, and universities was carried onboard this mission. Medical support logistics were evaluated, and concepts for a standardized program to be utilized during the mature STS operations were developed. S.L.

**N82-34002** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**VARIATIONS IN NOISE DOSIMETER READINGS OF FLUCTUATING NOISE**

Terry M. Fairman 1982 24 p refs  
 (AF Proj. 7231)  
 (AD-A115763; AFAMRL-TR-82-21) Avail: NTIS HC A02/MF A01 CSDL 06/19

Significant differences in the mean  $Leq(24)$  values were observed with dosimeters used in a study monitoring the daily noise exposures of children. That study, conducted by the Fels Research laboratory and the United States Environmental Protection Agency. In the Fels study a difference was observed in the mean  $Leq(24)$  values of about 7 dB using General Radio (Gen Rad) and Metrosonics noise dosimeters. The only statistically significant difference observed was between instrument types with the Gen Rad units reading higher. Possible explanations such as age and sex differences among the subjects and procedural differences were examined and ruled out. It was reasoned that group differences in mean  $Leq(24)$  recorded by the two dosimeter types were due to idiosyncrasies in the instruments themselves which resulted in systematic measurement errors. An investigation was conducted by the Bioacoustics Laboratory at Wright-Patterson

AFB to determine the cause and to quantify the observed differences.  
 Author (GRA)

**N82-34003** Desmatics, Inc., State College, Pa.  
**RESEARCH ON THE DEVELOPMENT OF A STATISTICAL IMPACT ACCELERATION INJURY PREDICTION MODEL FROM -G(X) ACCELERATOR RUNS**

Dennis E. Smith and David Aarons Jun. 1982 28 p refs  
 (Contract N00014-79-C-0128; NR Proj. 207-037)  
 (AD-A116440; TR-112-11) Avail: NTIS HC A03/MF A01 CSDL 06/19

Statistical impact acceleration injury prediction models are developed for the head/neck segment from data obtained during 68 -G sub x accelerator runs. These runs involved subhuman primates (Rhesus monkeys) with securely restrained torso and unrestrained head. The data was collected by the Naval Biodynamics Laboratory (NBDL) as part of its research effort on acceleration impact injury prevention. Three classes of prediction models are constructed, one based on sled profile variables, another based on head dynamic response variables only, and the third comprised of the combined set of independent variables. The model predictions are compared with the observed results to evaluate performance.  
 Author (GRA)

**N82-34004** Brown Univ., Providence, R. I. Center for Neural Science.

**AN AUTOMATED OPTICAL DISPLAY SYSTEM FOR VISUAL PHYSIOLOGY EXPERIMENTS**

J. D. Daniels and T. R. Myers 5 Jul. 1982 23 p  
 (Contract N00014-81-K-0136; NR Proj. 201-484)  
 (AD-A116499; TR-5) Avail: NTIS HC A02/MF A01 CSDL 05/10

Control of a visual physiology overhead projection system has been achieved by an 8085 microprocessor system, with a supporting array of a-d converters, voltage-to-current amplifiers, d-a converters, and analog switches. Image position, speed of movement, direction, length of sweep and number of sweeps can all be programmed by the operator. Handshake lines send the 'start' and 'end' signals to another device which correlates nerve cell activity with stimulus movement.  
 Author (GRA)

**N82-34005** Eidgenoessische Anstalt fuer das Forstliche Versuchswesen, Birmensdorf (Switzerland).

**DEVELOPMENT OF NITROGEN SENSOR FOR DETERMINATION OF  $PN(2)$  IN BODY TISSUES** Final Report, 1 Jan. - 30 Jun. 1982

Lois S. Robblee and Maureen A. Parker Jul. 1982 30 p refs  
 (Contract N00014-82-C-0133; NR Proj. 201-563)  
 (AD-A116607; C-687) Avail: NTIS HC A03/MF A01 CSDL 06/16

Experiments were performed to determine the feasibility of an electrochemical sensor for dissolved  $N_2$  based on  $N_2$ -complexing activity of Ru amines. The formation of  $Ru(NH_3)_5N_2+2$  by the reaction of  $Ru(NH_3)_5H_2O+2$  and  $N_2(aq)$  was observed by voltammetry as a progressive increase in anodic-current peak at +0.8V SCE due to the oxidation of  $Ru(NH_3)_5N_3+2$ .

Author (GRA)

**N82-34006** Army Research Inst. of Environmental Medicine, Natick, Mass.

**PROLONGED SELF-PACED HARD PHYSICAL EXERCISE COMPARING TRAINED AND UNTRAINED MEN**

Leslie Levine, William J. Evans, Fred B. Winsman, and Kent B. Pandolf 9 Oct. 1981 26 p refs  
 (DA Proj. 3E1-62777-A-878)  
 (AD-A116608; USARIEM-M-33/82) Avail: NTIS HC A03/MF A01 CSDL 06/19

Six fit male subjects (25 yr, 180 cm, 72 kg, maximal  $VO_2 = 2.63$  mmol/kg/min to the -1 (59.0 ml/kg/min) and six sedentary male subjects (24 yr, 175 cm, 73 kg, maximal  $VO_2 = 2.01$  mmol/kg/min) performed self-paced hard physical exercise while walking over a 17.07 km course consisting of four different terrains (blacktop road, 4.02 km; dirt road, 4.65 km; light brush, 4.35 km; and heavy

brush, 4.05 km). All subjects carried no external load, 10 kg, and 20 kg over the entire course. Subjects were instructed to walk over all terrains as fast as possible. Time on each terrain for individual subjects was used to determine walking velocity and predicted energy expenditure; heart rate (HR) and rated perceived exertion were recorded as each subject completed each terrain. Walking velocity and absolute energy expenditure were not different between the two groups ( $p > 0.05$ ), and did not decline with time as the subjects traversed the course for any of the load carriage conditions. GRA

**N82-34007#** Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex. Dept. of Physiology and Biophysics.

**OXYGEN TRANSPORT TO HUMAN TISSUES Final Report**

Jack A. Loeppky, ed. and Marvin L. Riedesel, ed. Jun. 1981 409 p refs

(Grant AF-AFOSR-0218-81; AF Proj. 2312)

(AD-A115904; AFOSR-82-0487TR) Avail: NTIS

HC A18/MF A01 CSCL 06/16

A symposium entitled Oxygen Transport to Human Tissues was held 25-27 June 1981 at the Veterans Administration Medical Center, Albuquerque, New Mexico. This symposium was supported in part by the AFOSR, NASA, The USAF School of Aerospace Medicine, and the W. Randolph Lovelace II Memorial Lectureship Fund. A 377 page preceedings was published that includes six sections: Historical Perspectives; Alveolar-Capillary Gas Equilibration; Cardiovascular Adjustment, Oxygen Delivery, and Metabolic Needs; Effects of Altitude on Oxygen Transport; Oxygen Transport in Special Situations; and Clinical Problems in Oxygen Transport.

Author (GRA)

**N82-34008#** Northwestern Univ., Evanston, Ill.

**A DYNAMIC MODEL OF THE CERVICAL SPINE AND HEAD Final Technical Report, May 1978 - Aug. 1980**

J. Williams and T. Belytschko Wright-Patterson AFB, Ohio AFAMRL Nov. 1981 159 p refs

(Contract F33615-78-C-0523; AF Proj. 7231)

(AD-A114887; AFAMRL-TR-81-5) Avail: NTIS HC A08/MF A01 CSCL 06/19

A data base of the head and cervical spine structure for a three dimensional mathematical model of the human head-spine system was developed on the basis of recently obtained geometric and stiffness data. The model was developed for predicting detailed head-spine system responses and injury probabilities during, for example, retraction/ejection and ground impact. This model of the head and cervical spine structure treats the cervical spine and head as a collection of rigid bodies and deformable elements; the rigid bodies represent the vertebral bodies and head and the deformable elements represent the intervertebral discs, ligaments, facet joints and muscles. The model is completely three dimensional and can treat nonlinearities due to large displacements and material properties. The geometric data consist of the initial configuration of the vertebrae and the points of attachments of the muscles, discs and ligaments to the vertebrae. Particular attention was devoted to reproducing the orientations of the articular facets. Stiffness data for the intervertebral discs, ligaments and facet joints were developed. A muscle model which includes reflex and voluntary activation was included for the major muscles. Inertial data was developed by estimating the height and cross sectional area of the sections of the neck associated with each motion segment and multiplying by a uniform density. GRA

**N82-34009#** Civil Aeromedical Inst., Oklahoma City, Okla.

**EFFECTS OF PRIOR PHYSICAL EXERTION ON TOLERANCE TO HYPOXIA, ORTHOSTATIC STRESS, AND PHYSICAL FATIGUE**

Michael T. Lategola, Peggy J. Lyne, and Mary J. Burr Mar. 1982 15 p refs

(AD-A114741; FAA-AM-82-4) Avail: NTIS HC A02/MF A01 CSCL 06/19

Ten healthy men, 20-35 years old, were tested for tolerance to hypoxia, orthostatic stress, and physical fatigue after a period

of rest, and, on another occasion, after a period of physical exertion. Exertion consisted of four 10-min periods of pedal ergometry; each period consisted of a 30-watt (W) load imposed for 2 min, 60 W for 4 min, and 100 W for 4 min. Testing included a 100-min exposure to an oxygen/nitrogen gas mixture equivalent to 3658 m of altitude, 2 min of lower body negative pressure (LBNP) at -40 torr differential pressure, and 6 min of 50 W pedal ergometry. Psychomotor testing was conducted during hypoxic exposure. Although some statistically significant ( $p < \text{or} = 0.05$ ) physiological decrements were associated with prior physical exertion, psychomotor performance and mentation were not significantly affected. In this study, prior physical exertion produced no adverse effects on physiological tolerances, mentation, or psychomotor performance. Author (GRA)

**N82-34010#** School of Aerospace Medicine, Brooks AFB, Tex. **RESPONSES TO HARMONIC ACCELERATION WITH VARYING HEAD POSITIONS Final Report, 1 Mar. - 30 Oct. 1981**

Daniel E. Dreher, Kenneth W. Stevens, Edward J. Engelkens, and James W. Wolfe Mar. 1982 8 p refs

(AF Proj. 7755)

(AD-A114736; SAM-TR-82-5) Avail: NTIS HC A02/MF A01 CSCL 06/19

To determine if a particular head position results in maximal response to stimulation, 50 subjects were tested with sinusoidal acceleration in three head positions with reference to the horizontal plane. A PDP-11/34 digital computer was used to analyze the responses. The pertinent parameters were gain, phase, and directional preponderance. The results showed no difference in the parameters for the three head positions. This suggests that positioning a subject's head for rotational testing is not as critical as previously believed. Author (GRA)

**N82-34011#** Naval Aerospace Medical Research Lab., Pensacola, Fla.

**AIRSICKNESS DURING NAVAL FLIGHT OFFICER TRAINING: ADVANCED SQUADRON VT86-RIO (NEW SYLLABUS)**

W. Carroll Hixson, Fred E. Guedry, Jr., J. Michael Lentz, and Garry L. Holtzman Sep. 1981 67 p refs

(AD-A114685; NAMRL-1281) Avail: NTIS HC A04/MF A01 CSCL 05/9

This report is the sixth in a series dealing with a longitudinal study of airsickness in the Basic, Advanced, and Fleet Readiness Squadrons comprising the Naval Flight Officer Training Program. Flight data are presented on a second group of VT86-RIO students receiving secondary training under a new flight syllabus. Of the 106 students included in the study, approximately 72% reported being airsick on one or more flights, 46% reported vomiting on one or more flights, and 43% considered their flight performance to have been degraded by airsickness on one or more hops. Of the 2,072 hops flown by the students, airsickness, vomiting, and performance degradation were reported to have occurred on 18.1, 8.8, and 6.9%, respectively, of the flights. The report details the flight data by hops and by students and also relates the airsickness performance of the student group to performance on a selected battery of motion reactivity tests administered to a large segment of the squadron population prior to beginning flight training.

Author (GRA)

**N82-34012#** Naval Ocean Systems Center, San Diego, Calif.

**REMOTE MEDICAL DIAGNOSIS SYSTEM (RMDS) ADVANCED DEVELOPMENT MODEL (ADM) LABORATORY TEST RESULTS Test Report, Apr. 1978 - May 1979**

W. T. Rasmussen, I. Stevens, P. D. Hayes, J. West (WESTEC Services, Inc.), and F. W. Hunzelman (WESTEC Services, Inc.) Jan. 1982 213 p

(Contract N66001-78-C-0274; MO933PN)

(AD-A114073; NOSC/TR-691) Avail: NTIS HC A10/MF A01 CSCL 06/5

This report provides laboratory experimental evaluation of video transmissions of radiographs over the remote medical diagnosis system (RMDS) advanced development model terminals. The objectives of this evaluation were to obtain quantitative and qualitative data on the functional parameters of the RMDS ADM

terminals and components, to define design risks associated with the current approach to RMDS implementation, and to provide baseline data to support follow-on procurement of RMDS engineering development model (EDM) terminals. Author (GRA)

**N82-34013#** Brown Univ., Providence, R. I. Center for Neural Science.

**NEURON SELECTIVITY: SINGLE NEURON AND NEURON NETWORKS**

L. N. Cooper, P. Munro, and C. Scofield 8 Jul. 1982 41 p refs (Contract N00014-81-K-0136) (AD-A116886; Rept-6) Avail: NTIS HC A03/MF A01 CSCL 06/16

A theory for neuron selectivity in visual cortex is presented and compared with neurophysiological data. In this theory, a neuron becomes maximally selective over the set of patterns presented to it. Theoretical predictions correspond well with results of various experimental paradigms including normal rearing, monocular and binocular deprivation, and reverse suture. Extensions of the theory to cortical networks based on anatomical data are discussed. The ideal synapse, which can alter its function between excitatory and inhibitory modes, must be resolved into excitatory and inhibitory synapses to agree with anatomical observation. A mathematical appendix provides stability analysis of the model's fixed point behavior. GRA

**N82-34014#** Naval Health Research Center, San Diego, Calif. **AN EEG PREDICTOR OF PERFORMANCE DECREMENT IN A VIGILANCE TASK** Final Report, Oct. 1978 - Mar. 1982

David J. Hord Mar. 1982 14 p refs (MR0410103) (AD-A116960; NAVHLTHRSCHC-82-2) Avail: NTIS HC A02/MF A01 CSCL 05/10

An attempt was made to discover measures of EEG that could predict performance decrement on long term monitoring tasks in subjects who had not been previously sleep deprived. Ten subjects took part in a study in which alpha numeric symbols were discriminated on 1100 trials during continuous 3 hr watches. Each subject completed the 3 hr watch on each of 3 consecutive days. The reaction times for all trials on Day 2 and Day 3 were divided into the 10 percent fastest, 10 percent slowest, and the errors of omission (EO) for each session. Brain activity at the vertex (C2) was derived from the one second period preceding each trial. Ensemble spectral analysis of the EEG was completed for each subject to yield intensity at integral values of frequency from 1 to 12 Hz. It was found that the ratio of slow activity to intermediate (7-12 Hz) EEG activity at the vertex can differentiate EO trials from fast and slow responses and is reliable over at least 3 days. The technique could be used to monitor errors of omission in operational settings. Author

**N82-34015#** Beth Israel Hospital, Boston, Mass. Div. of Behavioral Medicine.

**VENTILATORY RESPONSES TO EXERCISE WHILE ELICITING THE RELAXATION RESPONSE**

Margaret A. Caudill, Ilan Kutz, John W. Hoffman, Gene Stainbrook, and Kent B. Pandolf 16 Apr. 1982 20 p refs (Grants PHS-HL-22727; PHS-HL-07374; DA Proj. 3E1-62777-A-878) (AD-A115102; USARIEM-M28/82) Avail: NTIS HC A02/MF A01 CSCL 06/19

The effect of the elicitation of the relaxation response by use of a meditative technique on selected ventilatory variables was studied in eleven experimental (E) subjects who pedaled on an electrically-braked cycle ergometer at a low exercise intensity (50 W) while simultaneously eliciting this response. Subjects in the E group had regularly elicited the relaxation response for a mean of 5.4 yrs (+ or - 1.4 S.E.). Respiratory rate (breaths/min 18.5C, 13.6E), minute ventilation (liters/min 20.17C, 17.92E), and ventilatory for oxygen (26.06C, 23.16E) decreased and tidal volume (liters/breath 1.15C, 1.49E) increased significantly ( $p < \text{or} = 0.05$ ) during the relaxation response period in the E group. None of these ventilatory responses differed significantly ( $p > 0.05$ ) between groups either before or after the meditation period.

Differences seen in oxygen uptake and the respiratory exchange ratio between groups throughout exercise were not significant while the heart rate response was significantly higher for the E group throughout exercise. Rated perceived exertion significantly increased in the E group between the meditative (9.7) and post-meditative (11.0) period. These changes demonstrate that a voluntary wakeful mental activity that produces the relaxation response may alter ventilatory responses during exercise. GRA

**N82-34016#** Kentucky Univ., Lexington. Biomedical Engineering Center.

**DYNAMIC RESPONSE OF VERTEBRAL ELEMENTS RESPONSE OF THE INTERVERTEBRAL JOINT TO TORSION** Annual Report, 1 Jan. - 31 Dec. 1981

J. F. Lafferty and D. A. Bowman 24 Feb. 1982 13 p ref Presented at the 1st Southern Biomed. Eng. Conf., Shreveport, La., 7-8 Jun. 1982

(Grant AF-AFOSR-3488-78; AF Proj. 2312) (AD-A115125; WGRL-82-1; AFOSR-82-0420TR) Avail: NTIS HC A02/MF A01 CSCL 06/19

Creep response obtained from torsional stress tests of the intervertebral joint are used to develop an analytical model. A series chain of four Kelvin units was found to provide an excellent representation of the viscoelastic properties of the material.

Author (GRA)

**N82-34017#** Army Research Inst. of Environmental Medicine, Natick, Mass.

**ACUTE ALBUMIN-INDUCED PLASMA VOLUME EXPANSION AND EXERCISE IN THE HEAT: EFFECTS ON HORMONAL RESPONSES IN MEN**

Ralph P. Francesconi, M. N. Sawka, R. W. Hubbard, and M. Mager 9 Apr. 1982 20 p refs (AD-A115180; USARIEM-M27/82) Avail: NTIS HC A02/MF A01 CSCL 06/19

To assess the responses of plasma hormones to acute expansion of plasma volume and exercise in the heat, 50 g of albumin or 200 ml saline was administered intravenously followed by exercise (40% VO sub 2 max) in the heat (45 C/20% rh). Blood samples were obtained after sitting in the heat for one hour, one hour after completion of infusion, after standing for 30 minutes, and 15, 30, 45 and 60 minutes after commencing exercise. While plasma cortisol was generally unaffected by these treatments, postural and exercise effects were manifested in the absence of the diurnal decrease that ordinarily occurs during the morning hours. Aldosterone levels were generally decreased and growth hormone levels were unaffected by albumin administration, while exercise in the heat resulted in an increase in both these hormones in the control and experimental groups. Angiotensin I levels were significantly decreased at several sampling intervals by albumin administration, but unaffected by exercise; however, vasopressin was unaffected by all experimental procedures. No correlations could be drawn between the intensity of these adaptational responses and the ability to complete the exercise protocol.

Author (GRA)

**N82-34018#** Letterman Army Inst. of Research, San Francisco, Calif.

**COMPARISON OF RHESUS AND HUMAN SPECTRAL DYNAMIC VISUAL ACUITY**

Harry Zwick, Kenneth R. Bloom, and David O. Robbins Apr. 1982 11 p refs (AD-A115258; LAIR-82-33TN) Avail: NTIS HC A02/MF A01 CSCL 05/10

The visual acuity of humans and rhesus monkeys is quite comparable for stationary targets. However, in many situations visual acuity is required for targets that are moving rather than stationary. In this experiment, we have measured the dynamic visual acuity function for the rhesus and compared it with the dynamic visual acuity for the human. For targets that are achromatic, the rhesus and human are quite comparable, although the Rhesus seems to have somewhat better acuity for targets that are moving at the upper velocity extremes. When measurements were made with chromatic targets, however, certain differences

appeared across species. In the short end of the spectrum, the blue region, the rhesus is somewhat superior in its acuity for high velocity targets; in the long end of the visible spectrum, the rhesus appears somewhat weaker in its ability to resolve rapidly moving targets. These differences are not inconsistent with recent observations of spectral differences between human and rhesus reported for static acuity measurements. Author (GRA)

**N82-34019#** Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.

**ZERO-CROSSINGS AND SPATIOTEMPORAL INTERPOLATION IN VISION: ALIASING AND ELECTRICAL COUPLING BETWEEN SENSORS**

T. Poggio, H. K. Nishihara, and K. R. K. Nielsen May 1982 50 p refs  
(Contract N00014-75-C-0643; Grant NSF MCS-79-23110)  
(AD-A117608; AI-M-675) Avail: NTIS HC A03/MF A01 CSCL 09/4

We will briefly outline a computational theory of the first stages of human vision according to which; (a) the retinal image is filtered by a set of centresurround receptive fields (of about 5 different spatial sizes) which are approximately bandpass in spatial frequency; and (b) zero-crossings are detected independently in the output of each of these channels. Zero-crossings in each channel are then a set of discrete symbols which may be used for later processing such as contour extraction and stereopsis. A formulation of Logan's zero-crossing results is proved for the case of Fourier polynomials an extension of Logan's theorem to 2-dimensional functions is also proved. Within this framework, we shall describe an experimental and theoretical approach (developed by one of us with M. Fahle) to the problem of visual acuity and hyperacuity of human vision. The positional accuracy achieved, for instance, in reading a vernier is astonishingly high, corresponding to a fraction of the spacing between adjacent photoreceptors in the fovea. Stroboscopic presentation of a moving object can be interpolated by our visual system into the perception of continuous motion; and this 'spatiotemporal' interpolation also can be very accurate. It is suggested that the known spatiotemporal properties of the channels envisaged by the theory of visual processing outlined above implement an interpolation scheme which can explain human vernier acuity for moving targets. GRA

**N82-34020#** Naval Construction Battalion Center, Port Hueneme, Calif.

**BIODYNAMIC DATA BANK FEASIBILITY STUDY**

Carley C. Ward Wright-Patterson AFB, Ohio AMRL Jun. 1982 24 p refs  
(Contract F007624-79-0007; AF Proj. 7231)  
(AD-A117921; AFAMRL-TR-82-39) Avail: NTIS HC A02/MF A01 CSCL 06/19

The report presents an investigation into the feasibility of establishing a biodynamic data base at Air Force Aerospace Medical Laboratory. The original objective of this study was to assess the feasibility of a biodynamic data bank at AMRL. Potential problems were to be analyzed, and recommendations made regarding the basic design and indexing scheme. Considering the overwhelming need for organization and storage of the data, and the available digital data management techniques, a biodynamic data bank is definitely feasible. It is the various data bank options which need to be carefully considered. In this document AMRL's data base requirements are examined. The procedure and programs which will satisfy these requirements are recommended for implementation. Author (GRA)

**N82-34021#** Army Research Inst. of Environmental Medicine, Natick, Mass.

**EFFECTIVENESS OF ICE (WATER) PACKETS VESTS IN REDUCING HEAT STRESS**

George F. Fonseca Mar. 1982 44 p refs  
(DA Proj. 3E1-62777-A-878)  
(AD-A117864; USARIEM-T-3/82) Avail: NTIS HC A03/MF A01 CSCL 09/19

The auxiliary cooling provided over the torso area by each of two similar ice (water) packets vests was directly measured on a

life-sized sectional manikin. These vests were worn with a combat vehicle crewman (CVC) ensemble plus a complete chemical protective (CW) suit. Cooling rates provided (watts) versus time were determined for a completely wet (maximal sweating) skin condition during heat exposure to three hot environments. The number of ice packets attached to a vest varied from 43 to 91 ice packets. When approximately 50% of the torso surface area is covered by ice packets, each additional ice packet added to the vest increases the torso cooling to a greater degree than an ice packet added to a vest with less than 50% torso surface area coverage. Interface temperature between two ice packets and the torso surface and the temperature changes inside one ice packet during and experiment, were also measured. Author (GRA)

**N82-34022#** Brookhaven National Lab., Upton, N. Y. Biomedical and Environmental Assessment Div.

**TOXICITY OF SILICON COMPOUNDS**

Kenneth M. Novak Jun. 1981 14 p refs  
(Contract DE-AC02-76CH-00016)

(DE82-014245; BNL-51509) Avail: NTIS HC A02/MF A01

Silica toxicity was reviewed relative to assessing the health risks from a developing photovoltaic industry. Mechanism of physiological damage, possible exposure pathways of concern, and potential occupational and public hazards were examined. Acute and chronic effects were differentiated and appropriate methods for quantitative risk assessment described. DOE

**N82-34023#** National Bureau of Standards, Washington, D.C. National Measurement Lab.

**TABLES OF ENERGY-DEPOSITION DISTRIBUTIONS IN WATER PHANTOMS IRRADIATED BY POINT-MONODIRECTIONAL ELECTRON BEAMS WITH ENERGIES FROM 1 TO 60 MeV, AND APPLICATIONS TO BROAD BEAMS**

M. J. Berger and S. M. Seltzer Jan. 1982 58 p refs Presented at the Electron Dosimetry and Arc Therapy Symp., Madison, Wisc., 10-11 Sep. 1981 Sponsored in part by DOE and ONR  
(PB82-178716; NBSIR-82-2451) Avail: NTIS HC A04/MF A01 CSCL 06R

Tables of elementary three-dimensional absorbed-dose distributions in a water phantom irradiated by monoenergetic, point-monodirectional electron beams are presented. Distributions were obtained by the Monte Carlo method for 14 beam energies from 1 MeV to 60 MeV. The tabulated results can be applied to the determination of absorbed-dose distributions from parallel beams of arbitrary finite cross section. The beam of interest is treated as a superposition of point-monodirectional beams, and the absorbed-dose distribution is obtained as a corresponding superposition of elementary absorbed-dose distributions. By way of example, the tabulated data are used to obtain (1) depth-dose curves and practical ranges in broad-beam geometry, and (2) central-axis depth-dose curves, radial distributions of absorbed dose, and isodose patterns for beams with finite circular cross section. GRA

**N82-34024#** Science Information Services, Inc., Philadelphia, Pa. **BIOLOGICAL EFFECTS OF NONIONIZING ELECTROMAGNETIC RADIATION: A DIGEST OF CURRENT LITERATURE, JULY THROUGH SEPTEMBER 1981, VOLUME 6, NUMBER 1**

Bruce Kleinstein Dec. 1981 180 p  
(PB82-176504; NTIA-CR-81-15-Vol-6-No-1) Avail: NTIS HC A09/MF A01 CSCL 06R

Research highlights on the biological effects and health implications of microwave and other radio frequency radiations are included. News items and announcements, a listing of meetings and conferences, and abstracts of research and literature are presented. GRA

**N82-34025#** CONCAWE, Hague (Netherlands). Industrial Hygiene Sub-Group.

**EXPOSURE TO ATMOSPHERIC BENZENE VAPOUR ASSOCIATED WITH MOTOR GASOLINE**

J. M. Tims, M. Conrard, G. F. Cutolo, V. A. Dodsworth, P. Edgington, H. C. Frohne, G. P. Gaskill, G. Rousseaux, W. Rubben, A. Truchot et al Feb. 1981 61 p refs  
(PB82-174244; CONCAWE-2/81) Copyright. Avail: NTIS

HC A04/MF A01 CSCL 06J

A general interest in personal exposure to benzene was accentuated in 1976 when the US Federal Occupational Safety and Health Administration (OSHA) issued a regulation reducing employee exposure limits from 10 ppm to 1 ppm measured as an 8-hour time weighted average (TWA). The data collected during 1977 and 1978 in normal handling of gasoline in European manufacturing and distribution systems are summarized. GRA

**N82-34026#** Chicago Univ., Ill. Center for Decision Research. **A THEORY OF DIAGNOSTIC INTERFERENCE. 1: IMAGINATION AND THE PSYCHOPHYSICS OF EVIDENCE** Hillel J. Eindhorn and Robin M. Hogarth Jun. 1982 79 p refs (Contract N00014-81-K-0314) (AD-A115940; TR-2) Avail: NTIS HC A05/MF A01 CSCL 05/10

Diagnostic inference involves the assessment and generation of causal hypotheses to account for observed outcomes/evidence. The importance of diagnosis for prediction, defining 'relevant' variables, and illuminating the nature of conflicting metaphors in inference is first discussed. Since many diagnostic situations involve conflicting evidence, a model is developed for describing how people assess the likelihood that one of two hypotheses is true on the basis of varying amounts of evidence for each. A central notion is that one compares the evidence at hand with the evidence that 'might have been.' This is modeled via an anchoring and adjusting process where the anchor represents 'what is' and the adjustment is based on imaging a contrast case for comparison. Four aspects of this model are then considered. The relation between evidentiary strength and amount of evidence (the evidence function) is shown to mimic a set of power functions. Moreover, the form of the function implies that people will trade-off relative frequency (p) for amount of evidence (n) at small n; that the absolute amount of evidence effects evidentiary strength independent of p; and that 'over' underweighting' of probabilities decreases as amount of evidence increases. GRA

**N82-34027#** RAND Corp., Santa Monica, Calif. **ON THE MODELLING OF CREATIVE BEHAVIOR** Harold Cohen Nov. 1981 65 p refs (AD-A116896; RAND/P-6681) Avail: NTIS HC A04/MF A01 CSCL 05/10

The introduction to this paper discusses the notion of human creativity, and raises the question of designing a 'creative' computer program. Creativity is assumed not to imply the possession of special mental equipment: a theory of creativity should be a theory of intellect which accounts for normal performance and enhanced performance in the same terms. Art-making is described as a form of creative behavior which demonstrates the important of non-rational features. It is argued that the central feature of 'enhanced' intellectual performance is the individual's ability to modify, by the manipulation of internal representations, his/her own mental structures. GRA

**N82-34028#** New Mexico State Univ., Las Cruces. Dept. of Psychology. **STRUCTURES OF MEMORY FOR CRITICAL FLIGHT INFORMATION Interim Report, 1 May 1980 - 31 Jul. 1981** Roger Schvaneveldt, W., Timothy E. Golsmith, Francis T. Durso, Kenneth Maxwell, and Hector M. Acosta Williams AFB, Ariz. Air Force Human Resources Lab. Jun. 1982 118 p refs (Contract F33615-80-C-0004; AF Proj. 2313) (AD-A116510; AFHRL-TP-81-46) Avail: NTIS HC A06/MF A01 CSCL 05/10

This paper reviews work that has been done on defining and measuring conceptual structures of critical flight information in Air Force fighter pilots. Individuals with widely varying flight experience were tested. Cognitive structures were defined by analytic procedures; e.g., Multidimensional Scaling (MDS) and General Weighted Networks (GWN). The MDS analysis showed that the level of flying experience can be predicted from the pilot's conceptual structure. The GWN analysis led to the identification of specific points of agreement and disagreement in the concep-

tual organization of novice and expert pilots. Pilots do have measurable cognitive structures for organizing flight-related information. These structures are measurably different for individuals with different flight experience. The techniques employed in the research produce descriptions of conceptual structure that may have applications in the training program of fighter pilots and in assessing individual differences in the development of appropriate conceptual structures. Author (GRA)

**N82-34029#** Perceptronics, Inc., Woodland Hills, Calif. **HRTES HUMAN RESOURCES TEST AND EVALUATION SYSTEM. VOLUME 1: TEST PROCEDURES** Jonathan D. Kaplan, Norman D. Schwalm, and William H. Crooks May 1982 60 p refs (Contract DAHC19-77-C-0055) (AD-A115594) Avail: NTIS HC A04/MF A01 CSCL 05/10

This chapter includes a brief description of the contents of HRTES and a summary of the procedures that can be used to identify and evaluate human performance in an Operational Test. The chapter also describes the products that will be developed when HRTES is used, and the relationship of these HRTES products to the other documents that are produced during the course of planning and conducting operational tests. This chapter concludes with a description of the organization of these two HRTES volumes. Author (GRA)

**N82-34030#** Perceptronics, Inc., Woodland Hills, Calif. **HRTES HUMAN RESOURCES TEST AND EVALUATION SYSTEM. VOLUME 2: SUPPLEMENT** Jonathan D. Kaplan, Norman D. Schwalm, and William H. Crooks May 1982 226 p refs (Contract DAHC19-77-C-0055) (AD-A115595) Avail: NTIS HC A11/MF A01 CSCL 05/10

Guidance is planning and evaluating human performance for operational tests is given. A series of steps (or tasks) that are performed in planning and evaluating human factors are given. A list of tasks for a number of military systems is given. R.J.F.

**N82-34031#** Washington Univ., Seattle. Dept. of Psychology. **STRESS, ANXIETY, AND COGNITIVE INTERFERENCE: REACTIONS TO TESTS** Irwin G. Sarason 1 Apr. 1982 56 p refs (Contract N00014-80-C-0522) (AD-A113564; CO-ONR-005) Avail: NTIS HC A04/MF A01 CSCL 05/10

Test anxiety, its nature and relationships to performance and cognitive interference, are analyzed from the standpoint of attentional processes. A new instrument to assess dimensions of reactions to tests is presented, and its psychometric properties are described. The scales of the Reactions to Tests questionnaire (Worry, Tension, Test-irrelevant Thinking, Bodily Symptoms) were compared with regard to intellectual performance and cognitive interference. The results were consistent with the idea that the problem of anxiety is, to a significant extent, a problem of intrusive thoughts that interfere with task-focused thinking. In the last of the three studies reported, it was shown that self-preoccupying intrusive thinking can be reduced by means of a task-focusing experimental condition. The studies suggest that the Reactions to Tests questionnaire may be useful in defining anxiety more sharply and improving understanding of how it relates to performance. Author (GRA)

**N82-34032#** Illinois Univ., Urbana. Engineering-Psychology Research Lab. **THE EFFECT OF STIMULUS-CENTRAL PROCESSING-RESPONSE COMPATIBILITY AND RESOURCE COMPETITION ON PILOT PERFORMANCE** Diane Sandry and Christopher D. Wickens Apr. 1982 67 p refs (Contract N00014-79-C-0658) (AD-A113754; EPL-82-1/ONR-82-1) Avail: NTIS HC A04/MF A01 CSCL 05/10

The concept of stimulus-central processing-response compatibility is described as a principle by which a task with verbal

central-processing components is best served by auditory input and speech response, while a task with spatial processing components is best served by visual input and manual response. A model is proposed that predicts the joint effects of S-C-R compatibility and resource competition when a spatial and verbal task, each paired with all four input/output modality combinations, is time-shared with a visually displayed manual control task. This model was tested in an F-18 flight simulator. Nine subjects time-shared a discrete verbal (communication, navigation, and identification), and spatial (target acquisition) task with the task of flying the simulator through two-dimensional 'tunnel' in the sky. Each discrete task was performed singly with all four i/o combinations, and also concurrently with the flight task. The predictions of the model were upheld. Single task performance on each task benefitted from increasing levels of S-C-R compatibility. In dual task conditions, performance was influenced jointly by compatibility and by resource competition as predicted from the multiple resource model. Furthermore, conditions of high compatibility were uninfluenced by increases in flight task difficulty, while conditions of low compatibility suffered degradation from the difficulty increase. GRA

**N82-34033#** Embry-Riddle Aeronautical Inst., Daytona Beach, Fla. Aviation Research Center.

**THE EFFECTS OF PILOT EXPERIENCE OF ACQUIRING INSTRUMENT FLIGHT SKILLS, PHASE 2 Final Report, Mar. 1981 - Jan. 1982**

Charles W. Holmes and Jerry M. Childs Mar. 1982 142 p refs Prepared in cooperation with Seville Research Corp., Pensacola, Fla.

(Contract DOT-FA79NA-6040)

(AD-A113576; DOT/FAA/CT-82/35) Avail: NTIS HC A07/MF A01 CSCL 05/9

Because of the relatively high involvement of low-time noninstrument rated general aviation pilots in fatal weather-related accidents, a study was undertaken by the FAA through a contract with Embry-Riddle Aeronautical University (E-RAU) to determine the relationship between total flight time and the ability to acquire instrument flying skills. Specifically, the study examined the feasibility of reducing the present 200-hour experience requirement (FAR 61.65) for an instrument rating. The results of the study indicated that a reduction in the 200-hour requirement should be considered. The study reported here extended the findings of that study to a more heterogeneous population, aircraft of greater complexity, and a training program conducted in a noninstitutional setting. Thirty-five low-time pilots of diverse ages and occupations completed an instrument training program conducted at the FAA Technical Center. Cessna 172 and Mooney M20 aircraft were used in training. Author (GRA)

**N82-34034#** Johns Hopkins Univ., Baltimore, Md.

**EXPERIMENTAL ANALYSIS OF TEAM PERFORMANCE: METHODOLOGICAL DEVELOPMENTS AND RESEARCH RESULTS** Henry H. Emurian, Joseph V. Brady, R. L. Ray, James L. Meyerhoff, and Edward H. Mougey 6 Jul. 1982 57 p refs

(Contract N00014-80-C-0467)

(AD-A116915; TR-ONR-6) Avail: NTIS HC A04/MF A01 CSCL 05/9

A programmed environment research laboratory that was designed and constructed to support functional analyses of individual and team performance effectiveness viewed conceptually within the context of a small scale microcommunity is described. The technical and organizational merits of a behavioral program, which structures team members' use of resources in a disciplined yet meaningful way, are suggested as a promising solution to the problem of motivating and monitoring individual and team performances. Previous research emphases, findings and more recent analyses of effects of replacing an established team participant with a novice team member are summarized. Finally, the results of such a replacement analysis, which was undertaken with a Team Multiple Task Performance Battery (TMTPB), are presented to demonstrate the dynamic interplay between individual and team performance effectiveness. Author

**N82-34035#** Dalhousie Univ., Halifax (Nova Scotia). Centre for Research in Sensory Psychology and Medical Physics.

**ASSESSMENT AND DEVELOPMENT OF OCULOMOTOR FLYING SKILLS BY THE APPLICATION OF THE CHANNEL THEORY OF VISION Annual Report, 1 Oct. 1980 - 30 Sep. 1981**

D. Regan Mar. 1982 74 p refs

(Grant AF-AFOSR-3711-78; AF Proj. 2313)

(AD-A115325; AFOSR-82-0441TR)

Avail: NTIS

HC A04/MF A01 CSCL 05/9

Pilots' landing and formation flight performance on the ASPT simulator correlated with visual sensitivity to an expanding flow pattern and with depth tracking test errors. Pilots who were better able to differentiate different rates of expansion of a test flow pattern achieved a greater percentage of hits and misses in low-level flight and bombing tasks. Aircraft flying grades correlated with flow pattern test results. Author (GRA)

**N82-34036#** Purdue Univ., Lafayette, Ind. Graduate School of Management.

**HUMAN CAPITAL ADJUSTMENTS TO TECHNOLOGICAL CHANGE IN THE COMPUTER INDUSTRY: THE CASE OF SCIENTISTS AND ENGINEERS Final Report**

William N. Cooke Jul. 1981 74 p refs

(Grant NSF SRS-79-11318)

(PB82-180969) Avail: NTIS HC A04/MF A01 CSCL 05I

On-the-job training plays a significant role in the adaptation of scientists and engineers to changing technology; format education acquired by full-time employees, however, does not. Also, the scientist or engineer is not likely to increase earnings as a result of on-the-job training or of the acquisition of format education unless a higher degree is earned. On-the-job training is viewed by the author as an employer decision and investment, and the theory of implicit contracts as more relevant in its explanation than the theory of the accumulation of human capital. Finally a conventional schooling and years of experience model, presuming completion of education before entry to the labor market, was not found to be adequate to explain earnings of scientists and engineers because such a large proportion partake of subsequent schooling and training. Author

**N82-34037\*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**SIXTEENTH ANNUAL CONFERENCE ON MANUAL CONTROL** Jul. 1982 647 p refs Conf. held in Cambridge, Mass., 5-7 May 1980 Prepared in cooperation with MIT, Cambridge

(NASA-TM-84273; A-9000; NAS 1.15:84273) Avail: NTIS HC A99/MF A01 CSCL 05H

Manual control is discussed in terms of operator modeling, measurement of human response, mental workload, pilot/operator opinion, effects of motion, aircraft displays, supervisory control, automobile driving, and remote manipulation.

**N82-34038\*#** Illinois Univ., Chicago. Coll. of Engineering.

**MODELING OF HUMAN OPERATOR DYNAMICS IN SIMPLE MANUAL CONTROL UTILIZING TIME SERIES ANALYSIS**

Gyan C. Agarwal, Frank Osafo-Charles, William D. O'Neill, and Gerald L. Gottlieb In NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 1-28 refs (For primary document see N82-34037 24-54)

(Grants NSF ENG-76-08754; NS-00196; NS-12877)

Avail: NTIS HC A99/MF A01 CSCL 05H

Time series analysis is applied to model human operator dynamics in pursuit and compensatory tracking modes. The normalized residual criterion is used as a one-step analytical tool to encompass the processes of identification, estimation, and diagnostic checking. A parameter constraining technique is introduced to develop more reliable models of human operator dynamics. The human operator is adequately modeled by a second order dynamic system both in pursuit and compensatory tracking modes. In comparing the data sampling rates, 100 msec between samples is adequate and is shown to provide better results than 200 msec sampling. The residual power spectrum and eigenvalue analysis show that the human operator is not a generator of periodic characteristics. Author

**N82-34039\*#** Systems Research Labs., Inc., Dayton, Ohio.

**A GUNNER MODEL FOR AN AAA TRACKING TASK WITH**

**INTERRUPTED OBSERVATIONS**

C. F. Yu, K. C. Wei, and M. Vikmanis (AMRL, Wright-Patterson AFB, Ohio) /*n* NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 29-38 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

The problem of modeling a trained human operator's tracking performance in an anti-aircraft system under various display blanking conditions is discussed. The input to the gunner is the observable tracking error subjected to repeated interruptions (blanking). A simple and effective gunner model was developed. The effect of blanking on the gunner's tracking performance is approached via modeling the observer and controller gains. Author

**N82-34040\*#** Analytical Mechanics Associates, Inc., Mountain View, Calif.

**MODELING HUMAN TARGET ACQUISITION IN GROUND-TO-AIR WEAPON SYSTEMS**

A. V. Phatak, R. L. Mohr, M. Vikmanis (AMRL, Wright-Patterson AFB, Ohio), and K. C. Wei (Systems Research Laboratories, Dayton, Ohio) /*n* NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 40-48 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

The problems associated with formulating and validating mathematical models for describing and predicting human target acquisition response are considered. In particular, the extension of the human observer model to include the acquisition phase as well as the tracking segment is presented. Relationship of the Observer model structure to the more complex Standard Optimal Control model formulation and to the simpler Transfer Function/Noise representation is discussed. Problems pertinent to structural identifiability and the form of the parameterization are elucidated. A systematic approach toward the identification of the observer acquisition model parameters from ensemble tracking error data is presented. Author

**N82-34041\*#** National Aerospace Lab., Amsterdam (Netherlands). **THE EFFECT OF VISUAL INFORMATION ON THE MANUAL APPROACH AND LANDING**

P. H. Wewerinke /*n* NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 49-64 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

The effect of visual information in combination with basic display information on the approach performance. A pre-experimental model analysis was performed in terms of the optimal control model. The resulting aircraft approach performance predictions were compared with the results of a moving base simulator program. The results illustrate that the model provides a meaningful description of the visual (scene) perception process involved in the complex (multi-variable, time varying) manual approach task with a useful predictive capability. The theoretical framework was shown to allow a straight-forward investigation of the complex interaction of a variety of task variables. Author

**N82-34042\*#** Bolt, Beranek, and Newman, Inc., Cambridge, Mass. **THE EFFECTS OF MULTIPLICATIVE MOTOR NOISE ON THE OPTIMAL HUMAN OPERATOR MODEL**

Alper K. Caglayan and William H. Levison /*n* NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 106-118 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

The effects of a multiplicative motor noise model on the optimal-control human operator model were analyzed. A study of the interaction between multiplicative motor noise variance, plant dynamics, and predicted operator response behavior shows that, in general, an increase in motor noise variance produces a decrease in operator gain and a decrease in high-frequency remnant. An increase in multiplicative motor noise variance is also reflected by an increase in the effective motor time constant; in the absence of a cost penalty on commanded control, the motor time constant equals the motor noise variance. Author

**N82-34043\*#** Systems Technology, Inc., Mountain View, Calif. **TRAINING AIRCRAFT DESIGN CONSIDERATIONS BASED ON THE SUCCESSIVE ORGANIZATION OF PERCEPTION IN MANUAL CONTROL**

Robert K. Heffley, Warren F. Clement, and Samuel J. Craig (Vought Corp., Hawthorne, Calif.) /*n* NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 119-126 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

The thesis that pilot skill development in the Navy approach and landing task is very strongly tied to the aircraft closure rate and, therefore, that pilot training for this task should be based on an appropriate progression closure rate is considered. A rational and explicit determination of design point approach speeds as well as other important aerodynamic features for training aircraft is also considered. Two keys are discussed: recognition of the significance of transitioning from a purely compensatory control loop technique to one involving a pursuit crossfeed between throttle and pitch attitude, and addressing the terminal flight path adjustment in terms of range-to-go. Author

**N82-34044\*#** Tokyo Univ. (Japan). Dept. of Aeronautics. **AN EXPERIMENTAL STUDY OF HUMAN PILOT'S SCANNING BEHAVIOR**

Kyuichiro Washizu, Keiji Tanaka (National Aerospace Lab., Tokyo), and Tatsuo Osawa /*n* NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 128-134 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

The scanning behavior and the control behavior of the pilot who manually controls the two-variable system, which is the most basic one of multi-variable systems are investigated. Two control tasks which simulate the actual airplane attitude and airspeed control were set up. In order to simulate the change of the situation where the pilot is placed, such as changes of flight phase, mission and others, the subject was requested to vary the weightings, as his control strategy, upon each task. Changes of human control dynamics and his scanning properties caused by the modification of the situation were investigated. By making use of the experimental results, the optimal model of the control behavior and the scanning behavior of the pilot in the two-variable system is proposed from the standpoint of making the performance index minimal. Author

**N82-34045\*#** Vereinigte Flugtechnische Werke G.m.b.H., Bremen (West Germany). Dept. of Human Factors Engineering and Simulations. **PARAMETRIC IDENTIFICATION OF HUMAN OPERATOR MODELS**

Norbert R. Ninz /*n* NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 137-145 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

The accurate and efficient identification of the human operator is still a need in human factors engineering especially concerning multivariable control. Control theoretic identification methods need to be tested with human operator models under realistic boundary conditions. The requirements and criteria for the use of parametric methods, selected models as well as the Maximum Likelihood Method and the Extended Kalman Filter are displayed. The experiments and results are comparatively discussed from the point of practical engineering. Author

**N82-34046\*#** Georgia Inst. of Tech., Atlanta. Systems Engineering Lab. **A COMPUTER SIMULATION APPROACH TO MEASUREMENT OF HUMAN CONTROL STRATEGY**

Joanne Green, Esther Lee Davenport, Harold F. Engler, and William E. Sears, III /*n* NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 146-151 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

Human control strategy is measured through use of a psychologically-based computer simulation which reflects a broader theory of control behavior. The simulation is called the human operator

performance emulator, or HOPE. HOPE was designed to emulate control learning in a one-dimensional preview tracking task and to measure control strategy in that setting. When given a numerical representation of a track and information about current position in relation to that track, HOPE generates positions for a stick controlling the cursor to be moved along the track. In other words, HOPE generates control stick behavior corresponding to that which might be used by a person learning preview tracking. Author

**N82-34047\*#** Analytic Sciences Corp., Reading, Mass.

**PILOT MODEL HYPOTHESIS TESTING**

John R. Broussard (Information and Control Systems, Inc., Hampton, Va.) and Paul W. Berry /*n* NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 152-170 refs

(Contract N00014-75-C-0432)

Avail: NTIS HC A99/MF A01 CSCL 05H

The aircraft control time history predicted by the optimal control pilot model and actual pilot tracking data obtained from NASA Langley's differential maneuvering simulator (DMS) are analyzed. The analysis is performed using a hypothesis testing scheme modified to allow for changes in the true hypothesis. A finite number of pilot models, each with different hypothesized internal model representations of the aircraft dynamics, are constructed. The hypothesis testing scheme determines the relative probability that each pilot model best matches the DMS data. By observing the changes in probabilities, it is possible to determine when the pilot changes control strategy and which hypothesized pilot model best represents the pilot's control behavior. J.D.

**N82-34048\*#** Massachusetts Inst. of Tech., Cambridge.

**SUBJECTIVE SCALING OF MENTAL WORKLOAD IN A MULTI-TASK ENVIRONMENT**

Bahman Daryanian /*n* NASA. Ames Research Center 16th Conf. on Manual Control Jul. 1982 p 172-187 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

Those factors in a multi-task environment that contribute to the operators' 'sense' of mental workload were identified. The subjective judgment as conscious experience of mental effort was decided to be the appropriate method of measurement. Thurstone's law of comparative judgment was employed in order to construct interval scales of subjective mental workload from paired comparisons data. An experimental paradigm (Simulated Multi-Task Decision-Making Environment) was employed to represent the ideal experimentally controlled environment in which human operators were asked to 'attend' to different cases of Tulga's decision making tasks. Through various statistical analyses it was found that, in general, a lower number of tasks-to-be-processed per unit time (a condition associated with longer interarrival times), results in a lower mental workload, a higher consistency of judgments within a subject, a higher degree of agreement among the subjects, and larger distances between the cases on the Thurstone scale of subjective mental workload. The effects of various control variables and their interactions, and the different characteristics of the subjects on the variation of subjective mental workload are demonstrated. J.D.

**N82-34049\*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**EFFECT OF COUNTING AND TRACKING ON VERBAL AND PRODUCTION METHODS OF TIME ESTIMATION**

Kathleen L. Bird (San Jose State Univ.) and Sandra Hart (Tufts Univ.) /*n* its 16th Ann. Conf. on Manual Control Jul. 1982 p 189-210 refs

(Contract NCC2-34; Grant NsG-2156)

Avail: NTIS HC A99/MF A01 CSCL 05H

The effects of time estimation technique and task condition on the production and verbal estimation of time intervals ranging from 5 to 14 sec were investigated. The duration of time intervals during each task condition pretracking, tracking (subject performed a one-axis tracking), and posttracking was estimated by the subjects. The ratio of the subject's time estimate to actual interval length was computed for each trial. Productions were

typically longer than verbal estimates of the same duration and produced durations were typically too long whereas verbal estimates were too short relative to the correct duration. A significant interaction was found between counting technique and tracking condition for both estimation methods. A significant effect could be attributed to the addition of a tracking task: produced durations increased in length, whereas verbal estimates decreased in length. The durations produced without counting were significantly less accurate and consistent with the addition of a tracking task. Verbal estimation mean accuracy, but not consistency, was adversely affected by the addition of a tracking task when the subjects were instructed not to count. J.D.

**N82-34050\*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

**A MODEL-BASED TECHNIQUE FOR PREDICTING PILOT OPINION RATINGS FOR LARGE COMMERCIAL TRANSPORTS**

William H. Levison /*n* NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 216-241 refs Prepared in cooperation with Douglas Aircraft Co., Inc., St. Louis, Mo.

(Contract NAS1-15529)

Avail: NTIS HC A99/MF A01 CSCL 05H

A model-based technique for predicting pilot opinion ratings is described. Features of this procedure, which is based on the optimal-control model for pilot/vehicle systems, include (1) capability to treat 'unconventional' aircraft dynamics, (2) a relatively free-form pilot model, (3) a simple scalar metric for attentional workload, and (4) a straightforward manner of proceeding from descriptions of the flight task environment and requirements to a prediction of pilot opinion rating. The method was able to provide a good match to a set of pilot opinion ratings obtained in a manned simulation study of large commercial aircraft in landing approach. Author

**N82-34051\*#** National Aerospace Lab., Tokyo (Japan).

**AN ANALYTICAL PREDICTION OF PILOT RATINGS UTILIZING HUMAN PILOT MODEL**

Keiji Tanaka and Kyuichiro Washizu (Tokyo Univ., Japan) /*n* NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 243-252 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

In order to analytically predict pilot ratings, an evaluation method of a manual control system which consists of an aircraft and a human pilot, is proposed and examined. The method is constructed upon the assumptions that the control mission determines the critical frequency the pilot should bring to his focus, and that the degree of closed-loop stability and the human compensation necessary to attain the stability determine the human subjective evaluation of the system. As a result, a simple evaluation chart is introduced. The chart enables prediction of the subjective evaluation, if the controlled element dynamics and the mission are given. The chart is in good accord with almost all of the existing results of pilot ratings. This method has the following advantages: (1) simplicity, in a sense that the method needs to evaluate only two typical controlled element parameters, namely, the gain slope and the phase at the critical control frequency; (2) applicability to unstable controlled elements; (3) predictability of controllability limits of manual control; (4) possibility of estimating human compensatory dynamics. Author

**N82-34052\*#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Dept. of Electrical Engineering.

**EFFECTS OF HIGHER ORDER CONTROL SYSTEMS ON AIRCRAFT APPROACH AND LANDING LONGITUDINAL HANDLING QUALITIES**

Muhammad A. Pasha (Pakistan AF), John J. Dazzo, and James T. Silverthorn /*n* NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 254-263 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

An investigation of approach and landing longitudinal flying qualities, based on data generated using a variable stability NT-33

aircraft combined with significant control system dynamics is described. An optimum pilot lead time for pitch tracking, flight path angle tracking, and combined pitch and flight path angle tracking tasks is determined from a closed loop simulation using integral squared error (ISE) as a performance measure. Pilot gain and lead time were varied in the closed loop simulation of the pilot and aircraft to obtain the best performance for different control system configurations. The results lead to the selection of an optimum lead time using ISE as a performance criterion. Using this value of optimum lead time, a correlation is then found between pilot rating and performance with changes in the control system and in the aircraft dynamics. It is also shown that pilot rating is closely related to pilot workload which, in turn, is related to the amount of lead which the pilot must generate to obtain satisfactory response. The results also indicate that the pilot may use pitch angle tracking for the approach task and then add flight path angle tracking for the flare and touchdown. Author

**N82-34053\*#** Princeton Univ., N. J. Flight Research Lab.  
**PILOT OPINIONS OF SAMPLING EFFECTS IN LATERAL-DIRECTIONAL CONTROL**

Robert F. Stengel and George E. Miller /in NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 265-270 refs

(Contract N00014-78-C-0257)

Avail: NTIS HC A99/MF A01 CSCL 05H

Flight experiments with a microprocessor control system were conducted to determine the effects of variations in sampling parameters on several pilots' opinions of lateral-directional flying qualities. Princeton's variable-response research aircraft (VRA), which is equipped with a microprocessor based digital flight control system (Micro-DFCS), was the test vehicle. Two U.S. Navy pilots evaluated the effects of sampling rate, quantization, and pure time delay during tracking, approach, and landing. Aircraft carrier approach tasks were conducted using a Navy approach mirror. Acquisition and tracking of fixed objects on the ground provided additional information related to the Navy mission. The longitudinal controls were implemented with analog electronics, while the lateral-directional pilot inputs (stick and rudder) were fed to the Micro-DFCS, which commanded the ailerons and rudder. The conceptual relationship between the evaluation pilot's lateral-directional inputs, the flight computer, and the aircraft are illustrated. Author

**N82-34054\*#** Arizona Univ., Tucson. Dept. of Systems and Industrial Engineering.

**A MODEL OF SUBJECTIVE PROBABILITIES FROM SMALL GROUPS**

William R. Ferrell and Kelly Rehm /in NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 271-284 refs

(Grant NSF ENG-78-09365)

Avail: NTIS HC A99/MF A01 CSCL 05H

Methods for aggregating the opinions of individual forecasters in order to improve the quality of probabilistic forecasts are presented. Experimental results obtained by Seaver in his study of probability judgments by groups of four people are considered. The decision variable partition model of subjective probability and a simple model of the effects of interaction on judgments were used to simulate the group judgment of discrete probabilities investigated by Seaver. The initial results of the simulation are very promising in that (1) they show the principal effects Seaver observed and (2) these effects can, for the most part, be traced to specific characteristics of the models. J.D.

**N82-34055\*#** Computer Sciences Corp., Mountain View, Calif.  
**VISUAL/MOTION CUE MISMATCH DURING A COORDINATED ROLL MANEUVER**

D. K. Shirachi /in NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 285-291 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

The effect of a performance mismatch between the simulator visual and motion display systems on pilot performance while

engaged in a compensatory tracking task, and the effect of a reduction in simulator motion scaling while maintaining constant visual scaling on pilot performance for this same task were investigated. A jet transport aircraft with motion in the roll and lateral simulator axes was used as a test vehicle for a computer simulation. The aircraft was disturbed by moderate levels of turbulence which resulted in flight path deviations in the roll and lateral axes. The task of the pilot was to maintain flight formation behind the aircraft in front of him as displayed by a video monitor located in the simulator cockpit. Experimental data consisting of pilot describing functions and pilot performance scores are presented and discussed as they relate to experimental evidence. J.D.

**N82-34056\*#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**A PERFORMANCE ANALYSIS STUDY OF A COMPLEX G FIELD EXPERIMENT**

D. W. Repperger /in NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 292-315 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

A performance analysis on data from an experiment which illustrates the degradation of tracking performance as the human is subjected to an environmental stressor is presented. The performance changes are defined and the statistical properties of human tracking with and without the stress effects examined. Performance is evaluated using an extension of a phase plane technique. A quantitative determination of stress effects on performance is defined explicitly in terms of parameters of a density function identified from the empirical data. The distribution functions which characterize tracking in a phase plane representation of the closed loop error signal are determined. J.D.

**N82-34057\*#** Systems Technology, Inc., Hawthorne, Calif.  
**DESCRIPTION/DEMONSTRATION OF BIODYN-80. A SOFTWARE PACKAGE FOR EVALUATING THE TRANSMISSIBILITY BETWEEN VEHICLE VIBRATION AND MOTIONS OF HANDS (IN CONTROLS), LIMBS, HEAD AND EYES**

Susan A. Riedel, Henry R. Jex, and Raymond E. Magdaleno /in NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 317-339 refs

(Contract F33615-79-C-0519)

Avail: NTIS HC A99/MF A01 CSCL 05H

A user-oriented program for exercising the 1980 version of the biodynamic model BIODYN-80 is described. The user inputs (modifies) some 80-100 variables describing the assumed posture, interface characteristics (e.g., stick 'feel' properties), and vestibular characteristics. The computer calculates the transfer functions between vibration input and various selected outputs of interest to the user. Another option is to output the operator's torso-limb-neuromuscular loop transmissibilities as seen at the stick, as required for the PIVIB computer program for computing tracking performance effects of vibration. Applications to some current problems are demonstrated. Author

**N82-34058\*#** Connecticut Univ., Storrs. Dept. of Electrical Engineering and Computer Science.

**MODELING LATERAL ACCELERATION EFFECTS ON PILOT PERFORMANCE**

Jonathan Korn and David L. Kleiman /in NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 340-348 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

Attendant to the direct side force maneuver of a Vectored Force Fighter is the transverse acceleration imposed on the pilot. This lateral acceleration (Gy), when combined with a positive Gz stress, is a potential source of pilot tracking performance impairment. A research effort to investigate these performance decrements includes experimental as well as analytical pilot performance modeling using the Optimal Control Model. Author

**N82-34059\*#** Systems Technology, Inc., Hawthorne, Calif.  
**A COMPREHENSIVE SYSTEM MODEL FOR MOTION/SPACE**

**SICKNESS. PRELIMINARY RESULTS**

Susan A. Riedel /in NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 349-368 refs

(Contract NAS2-10430)

Avail: NTIS HC A99/MF A01 CSCL 05H

A preliminary attempt to categorize and order the observed facts regarding motion sickness into a rational structure is discussed. An array of key facts, as assembled from the recent literature, consisting of a collection of motion space sickness observations which should be accounted for in the comprehensive model are given. A model structure which is responsive to the array of key facts, as well as to the other requirements of a working research tool (modularity, ease of use, conciseness, etc.) is also suggested. R.J.F.

**N82-34060\*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**EVALUATION OF A TRAJECTORY COMMAND CONCEPT FOR MANUAL CONTROL OF CARRIER APPROACHES AND LANDINGS**

Walter E. McNeill, G. Allan Smith, Jr., and Ronald M. Gerdes /in its 16th Ann. Conf. on Manual Control Jul. 1982 p 370-391 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

A novel trajectory control system concept was implemented to provide manual control of a conventional jet aircraft. This concept, called Total Aircraft Flight Control System (TAFCOS), utilizes an inverse model of the aerodynamic and propulsion characteristics and employs feedforward control to provide the required acceleration command. The concept requires on-board digital computations which can easily be handled by a modern airborne computer. The system was studied in a piloted simulation of the carrier approach and landing task with primarily visual flight and guidance cues. The principal modes of vertical flight-path control investigated were vertical velocity command and vertical acceleration command. The study included manual carrier approaches with and without moderate ship motion and associated air disturbances, and tests of the effects of discrete gusts. Manual control of flight path through this new concept was shown to be feasible as an addition to an automatic control system and to have potential as an improved mode of control over conventional control for the carrier approach task. Author

**N82-34061\*#** Systems Technology, Inc., Mountain View, Calif.

**APPLICATION OF A PILOT CONTROL STRATEGY IDENTIFICATION TECHNIQUE TO A JOINT FAA/NASA GROUND-BASED SIMULATION OF HEAD-UP DISPLAYS FOR CTOL AIRCRAFT**

Wayne F. Jewell /in NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 395-409 refs

(Contract NAS2-10385)

Avail: NTIS HC A99/MF A01 CSCL 05H

A technique for measuring a pilot's control strategy was developed, evaluated, and applied to a joint FAA-NASA ground-based simulation of two competing concepts of head-up displays for use in conventional takeoff and landing aircraft. The technique, called the Non-Intrusive Pilot Identification Program (NIPIP), estimates the pilot's input-output describing function and combined pilot-vehicle performance parameters such as crossover frequency and phase margin by using a time domain model of the pilot and a least-squares identification algorithm. NIPIP functions in realtime and uses a sliding time window to maintain freshness in the data; thus time-varying characteristics in the pilot's control strategy can be measured. R.J.F.

**N82-34062\*#** Grumman Aerospace Corp., Bethpage, N.Y. Guidance and Control Dept.

**DESIGN, SIMULATION AND EVALUATION OF ADVANCED DISPLAY CONCEPTS FOR THE F-16 CONTROL CONFIGURED VEHICLE**

Robert W. Klein and Walter M. Hollister (MIT) /in NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982

p 424-438 refs

(Grant AF-AFOSR-3260-78)

Avail: NTIS HC A99/MF A01 CSCL 05H

Advanced display concepts to augment the tracking ability of the F-16 Control Configured Vehicle (CCV) were designed, simulated, and evaluated. A fixed-base simulator was modified to represent the F-16 CCV. An isometric sidearm control stick and two-axis CCV thumb button were installed in the cockpit. The forward cockpit CRT was programmed to present an external scene (numbered runway, horizon) and the designed Heads Up Display. The cockpit interior was modified to represent a fighter and the F-16 CCV dynamics and direct lift and side force modes were programmed. Compensatory displays were designed from man-machine considerations. Pilots evaluated the Heads up Display and compensatory displays during simulated descents in the presence of several levels of filtered, zero-mean winds gusts. During a descent from 2500 feet to the runway, the pilots tracked a point on the runway utilizing the basic F-16, F-16 CCV, and F-16 CCV with advanced displays. Substantial tracking improvements resulted utilizing the CCV modes, and the displays were found to even further enhance the tracking ability of the F-16 CCV. R.J.F.

**N82-34063\*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**SEPARATION MONITORING WITH FOUR TYPES OF PREDICTORS ON A COCKPIT DISPLAY OF TRAFFIC INFORMATION**

Sharon Jago and Everett Palmer /in its 16th Ann. Conf. on Manual Control Jul. 1982 p 439-446 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

A clear and concise display format for use in later full mission simulator evaluation of the cockpit display of traffic information (CDTI) concept was studied. This experiment required airline pilots to monitor a CDTI and make perceptual judgments concerning the future position of a single intruder aircraft in relationship to their own aircraft (ownship). The main experimental variable was the type of predictor used to display future position of each aircraft. Predictors were referenced to the ground or to ownship and they either included turn rate information or did not. Other variables were the aircraft's separation distance when the judgment was required and the type of encounter (straight or turning). Results indicate that under these experimental conditions fewer errors were made when the predictor included turn rate information. There was little difference in overall error rate for the curved ground referenced and the ownship referenced predictors. R.J.F.

**N82-34064\*#** Ohio State Univ., Columbus. Dept. of Industrial and Systems Engineering.

**COMBINED DISCRETE NETWORK. CONTINUOUS CONTROL MODELLING OF OPERATOR BEHAVIOR**

R. A. Miller and Deborah J. Seifert (Airesearch Manufacturing Co., Phoenix, Ariz.) /in NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 448-463 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

The situation in which an operator is faced with a continuous control task plus one or more discrete information processing tasks is discussed. A modelling approach which has the capability of realistically representing both types of tasks and the resulting interactions is sought. The modelling approach utilizes discrete network models for the cognitive tasks and elements of an open-loop - closed-loop control representation for the continuous task. The approach is demonstrated through its application to a simulated Digital Avionics Information System in which subjects were required to perform retrieval and processing tasks as well as flight control. This model differs from conventional model in that system status sampling is not necessarily continuous or periodic. Rather, the pilot is assumed to read system status displays only as time permits and operate in a so-called open-loop preprogrammed fashion between sampling. R.J.F.

**N82-34065\*#** Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Industrial Engineering and Operations Research.

# **A MODEL OF HUMAN DECISION MAKING IN MULTIPLE PROCESS MONITORING SITUATIONS**

Joel S. Greenstein and William B. Rouse (Illinois Univ., Urbana) /*n* NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 465-486 refs Previously announced as A82-29671

(Grant NsG-2119)

Avail: NTIS HC A99/MF A01 CSCL 05H

Human decision making in multiple process monitoring situations is considered. It is proposed that human decision making in many multiple process monitoring situations can be modeled in terms of the human's detection of process related events and his allocation of attention among processes once he feels event have occurred. A mathematical model of human event detection and attention allocation performance in multiple process monitoring situations is developed. An assumption made in developing the model is that, in attempting to detect events, the human generates estimates of the probabilities that events have occurred. An elementary pattern recognition technique, discriminant analysis, is used to model the human's generation of these probability estimates. The performance of the model is compared to that of four subjects in a multiple process monitoring situation requiring allocation of attention among processes. R.J.F.

# **N82-34066\*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass. PROCRU: A MODEL FOR ANALYZING FLIGHT CREW PROCEDURES IN APPROACH TO LANDING**

S. Baron, G. Zacharias, R. Muraidharan, and R. Lancraft /*n* NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 488-520 refs

(Contract NAS2-10035)

Avail: NTIS HC A99/MF A01 CSCL 05H

A model for the human performance of approach and landing tasks that would provide a means for systematic exploration of questions concerning the impact of procedural and equipment design and the allocation of resources in the cockpit on performance and safety in approach-to-landing is discussed. A system model is needed that accounts for the interactions of crew, procedures, vehicle, approach geometry, and environment. The issues of interest revolve principally around allocation of tasks in the cockpit and crew performance with respect to the cognitive aspects of the tasks. The model must, therefore, deal effectively with information processing and decision-making aspects of human performance. R.J.F.

# **N82-34067\*# Systems Research Labs., Inc., Dayton, Ohio. APPLICATION OF OPTIMAL CONTROL PRINCIPLES TO DESCRIBE THE SUPERVISORY CONTROL BEHAVIOR OF AAA CREW MEMBERS**

Chris Hale and George J. Valentino (Air Force Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio) /*n* NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 523-532

Avail: NTIS HC A99/MF A01 CSCL 05H

Supervisory decision making and control behavior within a C(3) oriented, ground based weapon system is being studied. The program involves empirical investigation of the sequence of control strategies used during engagement of aircraft targets. An engagement is conceptually divided into several stages which include initial information processing activity, tracking, and ongoing adaptive control decisions. Following a brief description of model parameters, two experiments which served as initial investigation into the accuracy of assumptions regarding the importance of situation assessment in procedure selection are outlined. Preliminary analysis of the results upheld the validity of the assumptions regarding strategic information processing and cue-criterion relationship learning. These results indicate that this model structure should be useful in studies of supervisory decision behavior.

Author

# **N82-34068\*# Arnott (Douglas R.), Huntington Station, N.Y. DOES MAN ALWAYS CLOSE THE LOOP IN TRYING TO PILOT A LARGE SHIP?**

Douglass R. Arnott and T. Govindaraj (Purdue Univ., Lafayette, Ind.) /*n* NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 533-538 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

Control of a slowly responding complex dynamic system such as a large supertanker poses special problems for the human. Experienced ship's crew members maneuvered a simulated ship in real time. The simulation was performed using a graphics display run by a DPD 11/40 minicomputer. The maneuvers consisted of piloting a large ship along a narrow waterway. Preliminary results suggest that the human operates as a feedforward controller utilizing the preview information for 'gross changes' in heading, and as a feedback controller for correcting small deviations. The instruments displayed on the deck do not seem to be helpful in all situations. In fact, evidence seems to indicate that some of the displays might even interfere with the pilot's attempt to form a good internal model. Author

# **N82-34069\*# Technische Hogeschool, Delft (Netherlands). SUPERVISION OF DYNAMIC SYSTEMS: MONITORING, DECISION-MAKING AND CONTROL**

Ted N. White /*n* NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 540-547 refs Sponsored by Netherlands Organization for the Advancement of Pure Research (ZWO)

Avail: NTIS HC A99/MF A01 CSCL 05H

Effects of task variables on the performance of the human supervisor by means of modelling techniques are discussed. The task variables considered are: The dynamics of the system, the task to be performed, the environmental disturbances and the observation noise. A relationship between task variables and parameters of a supervisory model is assumed. The model consists of three parts: (1) The observer part is thought to be a full order optimal observer, (2) the decision-making part is stated as a set of decision rules, and (3) the controller part is given by a control law. The observer part generates, on the basis of the system output and the control actions, an estimate of the state of the system and its associated variance. The outputs of the observer part are then used by the decision-making part to determine the instants in time of the observation actions on the one hand and the controls actions on the other. The controller part makes use of the estimated state to derive the amplitude(s) of the control action(s). B.W.

# **N82-34070\*# Westfaelische Wilhelms Univ., Muenster (West Germany). EFFECTS OF MOTIVATION ON CAR-FOLLOWING**

Tom Boesser /*n* NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 549-556 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

Speed- and distance control by automobile-drivers is described best by linear models when the leading vehicles speed varies randomly and when the driver is motivated to keep a large distance. A car-following experiment required subjects to follow at 'safe' or at 'close' distance. Transfer-characteristics of the driver were extended by 1 octave when following 'closely'. Nonlinear properties of drivers control-movements are assumed to reflect different motivation-dependent control strategies. Author

# **N82-34071\*# Institute for Perception RVO-TNO, Soesterberg (Netherlands). LEVELS OF STEERING CONTROL: REPRODUCTION OF STEERING-WHEEL MOVEMENTS**

Hans Godthelp /*n* NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 557-582 refs

(Grant NSF PFR-79-17348)

Avail: NTIS HC A99/MF A01 CSCL 05H

A schematic description of the steering control process is presented. It is shown that this process can be described in terms of levels of control. Level of control will depend on driver's skill in making use of 'clever' strategies which may be related to knowledge

about the path to follow (input) and/or the vehicle under control. This knowledge may be referred to as an internal model of a particular task element. Internal information, as derived from these internal models will probably be used together with proprioceptive feedback. It is hypothesized that the efficiency of the higher levels of control will be dependent on the accuracy of both the internal and proprioceptive information. Based on this research philosophy a series of experiments is carried out. Two primary experiments were done in order to analyse subjects' ability to reproduce steering-wheel positions and movements without visual feedback. Steering-wheel angle amplitude, steering force and movement frequency were involved as independent variables.

Author

**N82-34072\*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**A COMPARISON OF CONTROL MODES FOR TIME-DELAYED REMOTE MANIPULATION**

Gregory P. Starr /In its 16th Ann. Conf. on Manual Control Jul. 1982 p 584-591 refs Previously announced as A79-30223

Avail: NTIS HC A99/MF A01 CSCL 05H

Transmission time delay in the communication channel of a manual control system is investigated. A time delay can exist in remote manipulation systems, caused by long communication distances or bandwidth limitations. Ferrell [1] conducted the first research in time-delayed manipulation using a two degree-of-freedom manipulator. His subjects, working at time delays of 1.0, 2.1, and 3.2 s, could accomplish tasks even requiring great accuracy. The subjects spontaneously adopted a pattern of moving cautiously, then waiting to see the results of their actions. In experiments with a six degree-of-freedom master-slave manipulator system and time delays of 1.0 to 6 s, Black [2] saw that subjects tried to use the move-and-wait strategy; but there were often difficulties. The subjects seemed to have a problem in holding the master arm stationary while waiting for feedback. Any undesired drifting of the master arm introduced a discrepancy between the positions of the master and slave. This discrepancy was not perceived because of the time delay. The subject would then begin his next move with an inherent error. The difficulty of effectively using the move-and-wait strategy with a master-slave manipulator suggested that rate control might be a more effective control mode with time delay.

B.W.

**N82-34073\*#** Jet Propulsion Lab., California Inst. of Tech., Pasadena. Robotics and Teleoperator Group.

**EXPERIMENTAL EVALUATION OF THE CONCEPT OF SUPERVISORY MANIPULATION**

T. L. Brooks and T. B. Sheridan (MIT) /In NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 593-605 refs

(Contracts NAS7-100; N00014-77-C-0256; Grant SG-04-7-158-44079)

Avail: NTIS HC A99/MF A01 CSCL 05H

A computer-controlled teleoperator system which is based on task-referenced sensor-aided control has been developed to study supervisory manipulation. This system, called SUPERMAN, is capable of performing complicated tasks in real-time by utilizing the operator for high-level functions related to the unpredictable portions of a task, while the subordinate machine performs the more well-defined subtasks under human supervision. To determine whether supervisory control schemes such as these offer any advantage over manual control under real-time conditions, a number of experiments involving both simple and complicated tasks were performed. Six representative tasks were chosen for the study: (1) obtaining a tool from a rack, (2) returning the tool to the rack, (3) removing a nut, (4) placing samples in a storage bin, (5) opening and closing a valve, and (6) digging with a shovel. The experiments were performed under simulated conditions using four forms of manual control (i.e., switch rate, joystick rate, master-slave position control, and master-slave with force feedback), as well as supervisory control. Through these experiments the effectiveness and quality of control were evaluated on the basis of the time required to complete each portion of the task and the type and number of errors which occurred.

Author

**N82-34074\*#** Jet Propulsion Lab., California Inst. of Tech., Pasadena.

**EVALUATION OF SMART SENSOR DISPLAYS FOR MULTIDIMENSIONAL PRECISION CONTROL OF SPACE SHUTTLE REMOTE MANIPULATOR**

A. K. Bejczy, J. W. Brown (NASA. Johnson Space Flight Center), and J. L. Lewis (NASA. Johnson Space Flight Center) /In NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 607-626 refs

(Contract NAS7-100)

Avail: NTIS HC A99/MF A01 CSCL 05H

An enhanced proximity sensor and display system was developed at the Jet Propulsion Laboratory (JPL) and tested on the full scale Space Shuttle Remote Manipulator at the Johnson Space Center (JSC) Manipulator Development Facility (MDF). The sensor system, integrated with a four-claw end effector, measures range error up to 6 inches, and pitch and yaw alignment errors within + or 15 deg., and displays error data on both graphic and numeric displays. The errors are referenced to the end effector control axes through appropriate data processing by a dedicated microcomputer acting on the sensor data in real time. Both display boxes contain a green lamp which indicates whether the combination of range, pitch and yaw errors will assure a successful grapple. More than 200 test runs were completed in early 1980 by three operators at JSC for grasping static and capturing slowly moving targets. The tests have indicated that the use of graphic/numeric displays of proximity sensor information improves precision control of grasp/capture range by more than a factor of two for both static and dynamic grapple conditions.

B.W.

**N82-34075\*#** Forschungsinstitut fuer Anthropotechnik, Wachtberg (West Germany).

**ANALYSIS OF DRIVER PERFORMANCE UNDER REDUCED VISIBILITY**

Wolf-Dieter Kaeppler /In NASA. Ames Research Center 16th Ann. Conf. on Manual Control Jul. 1982 p 630-637 refs

Avail: NTIS HC A99/MF A01 CSCL 05H

Mathematical models describing vehicle dynamics as well as human behavior may be useful in evaluating driver performance and in establishing design criteria for vehicles more compatible with man. In 1977, a two level model of driver steering behavior was developed, but its parameters were identified for clear visibility conditions only. Since driver performance degrades under conditions of reduced visibility, e.g., fog, the two level model should be investigated to determine its applicability to such conditions. The data analysis of a recently performed driving simulation experiment showed that the model still performed reasonably well under fog conditions, although there was a degradation in its predictive capacity during fog. Some additional parameters affecting anticipation and lag time may improve the model's performance for reduced visibility conditions.

Author

**N82-34076\*#** Texas A&M Univ., College Station. Dept. of Plant Sciences.

**AIR POLLUTANT PRODUCTION BY ALGAL CELL CULTURES**

Franklin Fong and Edward A. Funkhouser Aug. 1982 33 p refs (Contract NCC2-102)

(NASA-CR-166384; NAS 1.26:166384)

Avail: NTIS

HC A03/MF A01 CSCL 06K

The production of phytotoxic air pollutants by cultures of *Chlorella vulgaris* and *Euglena gracilis* is considered. Algal and plant culture systems, a fumigation system, and ethylene, ethane, cyanide, and nitrogen oxides assays are discussed. Bean, tobacco, mustard green, cantaloupe and wheat plants all showed injury when fumigated with algal gases for 4 hours. Only coleus plants showed any resistance to the gases. It is found that a closed or recycled air effluent system does not produce plant injury from algal air pollutants.

E.A.K.

**N82-34077\*#** California Univ., Berkeley. Dept. of Mechanical Engineering.

**APPLICATION OF CONTROL THEORY TO DYNAMIC SYSTEMS**

**SIMULATION**

D. M. Auslander, R. C. Spear, and G. E. Young Aug. 1982 68 p refs

(Contract NCC2-67)

(NASA-CR-166383; NAS 1.26:166383; CELSS-16) Avail: NTIS HC A04/MF A01 CSCL 06K

The application of control theory is applied to dynamic systems simulation. Theory and methodology applicable to controlled ecological life support systems are considered. Spatial effects on system stability, design of control systems with uncertain parameters, and an interactive computing language (PARASOL-II) designed for dynamic system simulation, report quality graphics, data acquisition, and simple real time control are discussed. S.L.

**N82-34078#** Naval Submarine Base, New London, Conn.

**COLD WEATHER GOGGLES. PART 3: RESISTANCE TO FOGGING Interim Report**

S. M. Luria and David F. Neri 17 May 1982 11 p refs (M0095PN001)

(AD-A115898; NSMRL-982-Pt-3) Avail: NTIS HC A01/MF A01 CSCL 06/17

Twelve pairs of goggles designed to protect the eyes from conditions in the cold were tested for their tendency to fog while being worn during strenuous exercise in very low temperatures. Subjects reported the visibility of targets of various contrasts during 15-minute periods of exercise. The times at which the different targets became invisible were recorded. There were wide differences between the goggles in their resistance to fogging as revealed by the ability of the subjects to detect the lowest contrast target; these differences declined as target contrast increased. In general, goggles advertised by the manufacturers to be resistant to fogging performed well and were better than goggles by the same manufacturer not so advertised. Author (GRA)

**N82-34079#** North Carolina Agricultural and Technical State Univ., Greensboro. Dept. of Industrial Engineering.

**A COMPUTER AIDED WORKSTATION ASSESSOR FOR CREW OPERATIONS - WOSTAS**

Babur Mustafa Pulat May 1982 47 p refs

(Contract N00014-81-C-0320)

(AD-A116045) Avail: NTIS HC A03/MF A01 CSCL 09/2

The last decade has witnessed the development of a number of computer aided workplace design and evaluation algorithms. However, none of these models specifically address the problem of designing the work-space of a crew. Multi-Man-Machine Work Area Design and Evaluation System-MAWADES is being developed for this purpose under a multi-year research program. Workstation Assessor - WOSTAS is the first module in MAWADES. WOSTAS is aimed at grouping and/or subdividing activities or tasks of a crew in such a way that all job stations have a fairly equal amount of work in terms of the time to perform the tasks. WOSTAS is a network based model, which accepts mission oriented task requirements of a crew, and generates suggested total number of workstations and the tasks to be carried out at each workstation. The model allows for probabilistic branchings in the mission data. Some of the task assignment criteria built into the model area: each task group should require fairly similar abilities, precedence relationships between tasks should be observed, whenever indicated, user enforced groupings or separations should be met, timewise work-loads should be fairly balanced across the task groups. GRA

**N82-34080#** ORLOC, Kettering, Ohio.

**A SYSTEMS APPROACH FOR CREW STATION DESIGN AND EVALUATION Final Report, 1 Jul. - 31 Dec. 1981**

John H. Kearns Wright-Patterson AFB, Ohio AFWAL Feb. 1982 105 p refs

(Contract F33615-81-C-3619; AF Proj. 2403)

(AD-A115663; AFWAL-TR-81-3175) Avail: NTIS HC A06/MF A01 CSCL 01/3

This report documents the development and current status of the Crew Systems Development Branch's (AFWAL/FIGR) methodology for designing and evaluating crew stations for new Air Force

aircraft. The report begins with a historical background for the problem area, and then overviews the methodology as employed today. This is followed by a detailed discussion of each of the major stages of the process. The report concludes with a discussion of resources typically involved in cockpit design efforts and a section on crew system testing and evaluation. Also included is a 300 item Bibliography, sampling the more than 10,000 relevant articles, reports and test documentation found in AFWAL/FIGR's Control Display Information Center (CDIC). Author (GRA)

**N82-34081#** Ohio State Univ., Columbus. Dept. of Psychology. **OPTICAL FLOW AND TEXTURE VARIABLES USEFUL IN SIMULATING SELF MOTION Interim Technical Report, 1 Feb. 1981 - 31 Jan. 1982**

Dean H. Owen May 1982 225 p refs

(Grant AF-AFOSR-0078-81)

(AD-A117016; AFOSR-82-0545TR)

Avail: NTIS

HC A10/MF A01 CSCL 06/16

The project is concerned with: (1) mathematically isolating optical flow and texture variables as candidates for visual information useful in guiding flight maneuvers; and (2) assessing the functional utility of these variables in judgment experiments and in fully interactive simulation environments. The major contribution of the reported year's effort was the development of a technique for holding optical variables invariant throughout self-motion events. The method was used to factorially study fractional rates of change as information for acceleration, deceleration, and loss in altitude. Assessment of individual differences in sensitivity to these optical variables was initiated, and the constraints on degrees of freedom in choosing variables for factorial experimental designs were determined. Optical analysis of 256 Boeing 747 simulator landings has begun to explore the applicability of our approach to flight situations. Studies of this kind will be used to guide future judgment and interactive experiments. Implications of optical analysis for aviation safety are also reported. Lastly, a review of performance measurement in research on visual control of flight is presented. The review will guide our development of optical variables and invariants as measures of performance, under the assumption that pilots make control adjustments in order to control what they perceive. Author (GRA)

**N82-34082#** Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.

**BLUE FLIGHT COVERALL PROGRAM Final Report**

Jules Z. Lewyckyj Dec. 1981 17 p

(AD-A116856; NADC-82074-60) Avail: NTIS HC A02/MF A01 CSCL 06/17

Presently used Flight Coveralls (CWU-27/P) are sage green. New Coveralls were manufactured from blue aramid to provide for a choice in color. These suits were given a special evaluation by operational squadrons. Although the suits were made from a heavy gabardine (the only fabric available in blue at the time of manufacture) which was somewhat uncomfortable in hot weather, the Coverall in general was satisfactory. A proposal is now being evaluated to manufacture and retest Coveralls using a lighter weight blue fabric. Author (GRA)

**N82-34083#** Army Research Inst. of Environmental Medicine, Natick, Mass.

**MICROCLIMATE COOLING FOR COMBAT VEHICLE CREWMEN**

Ralph F. Goldman 18 Jun. 1982 14 p refs Presented at the Army Sci. Conf., 15-18 Jun. 1982

(AD-A117156) Avail: NTIS HC A02/MF A01 CSCL 06/19

Several XM-1 tanks were available to study the heat stress/CW protection problem under desert conditions. A six day test was carried out; the first two days were for training, and resolving problems; the last four days comprised the data generating portion of the trial. Day 3 involved wearing the fully closed CW clothing system over the CVC uniform (MOPP IV); the vehicle hatches were left open, but the engine and ventilators were shut off. MOPP IV was also worn on the final three days of the study; the engine

and ventilators were shut off and all hatches closed on these three days. Significant heat stress was demonstrated, at a level to produce early performance decrements and eventually, subjective inability to continue; this was fully supported by physiological data as being a valid endpoint for performance capability. In conclusion, we have identified a clear mismatch between the ability of a crewman dressed in CW protective clothing and the simple demand that he perform an extremely light fire mission when ambient conditions (expressed as the WBGT) are in the 32 to 35 C (90 to 95 F) range. These occurred inside the XM-1 only when the hatches were closed and the blowers shut off. GRA

**N82-34084#** Naval Biodynamics Lab., New Orleans, La.

**REPEATED MEASURES OF HUMAN PERFORMANCE: A BAG OF RESEARCH TOOLS**

Alvah C. Bittner, Jr. and Robert C. Carter Nov. 1981 26 p refs (AD-A113954; NBDL-81R011) Avail: NTIS HC A03/MF A01 CSCL 06/19

Research tools are described which are applicable to repeated measures of human performance. In the first section, statistical criteria for tasks are delineated, tools for assessment are described, and examples of applications are given. In the second section, multiple subject and single subject analyses of intervention experiments are considered with major focus on the methodological tools. The final section summarizes these tools with examples of their application. Author (GRA)

**N82-34085#** Federal Aviation Administration, Washington, D.C. Systems Research and Development Service.

**EVALUATION OF FOUR-COLOR PLAN VIEW DISPLAY CONSOLE Final Report, Jun. 1978 - Oct. 1981**

John W. Aschenbach, Alan J. Kopala, and Lauren N. Douglass, Jr. Jun. 1982 93 p refs (AD-A117897; DOT/FAA/RD-82/46) Avail: NTIS HC A05/MF A01 CSCL 09/2

Technical and operational evaluations were conducted on Plan View Displays (PVDs) modified for both four-color and monochrome presentation. Two of six PVDs modified for color were tested and evaluated for display performance at the Federal Aviation Administration (FAA) Technical Center in Atlantic City, New Jersey. Data were collected on brightness and resolution, power consumption, color registration, character legibility and position accuracy, and distortion in the broadband or 'TV' mode. A registration board failure analysis, a maintainability analysis, and a radio frequency radiation survey were also performed. All six color PVDs were subjectively evaluated for operational suitability at the Washington Air Route Traffic Control Center (ARTCC) in Leesburg, Virginia. Data were collected to determine controller's reactions on the operational use of multicolor PVDs from questionnaires and taped interviews. Author (GRA)

**N82-34086#** Army Research Inst. of Environmental Medicine, Natick, Mass.

**LOW TEMPERATURE TESTS OF RESCUE BREATHING APPARATUS Final Report, Sep. 1978 - Dec. 1980**

Richard L. Burse and Louis D. Strong Jul. 1981 114 p (Contract DI-BM-J0-188026) (PB82-172727; BM-OFR-16-82) Avail: NTIS HC A10/MF A01 CSCL 06K

Two samples of three different types of rescue breathing apparatus (RBA) were tested to determine how long both could be worn by operators in subfreezing temperatures. Phase 1 tests were performed after overnight cold soaking at the test temperature; phase 2 tests were performed after overnight storage at +20C. Successful performance was determined as proper operation for at least one-half the certified duration of the oxygen supply without either exhaustion of the oxygen supply, increase of inspired CO2 above physiologically acceptable levels, or increase in breathing resistance above tolerable levels. In phase 1, the Scott 'Rescue Pak(R)' operated successfully at 20C, while the Drager 174-A and the McCaa units operated successfully at -10C. In phase 2, the Scott unit operated successfully at -25C, the Drager at -20C, and the McCaa at -15C. None of the RBA types appeared well-designed for use in subfreezing temperatures. GRA

**N82-34087#** Coast Guard Research and Development Center, Groton, Conn.

**A PILOT STUDY OF HUMAN FACTORS IN SAR Interim Report, Apr. 1980 - May 1982**

D. I. Remondini, M. Light, M. L. Everson, L. Nash, and D. L. Good May 1982 70 p refs (AD-A117917; CGR/DC-5/82; USCG-D-19-82) Avail: NTIS HC A04/MF A01 CSCL 05/5

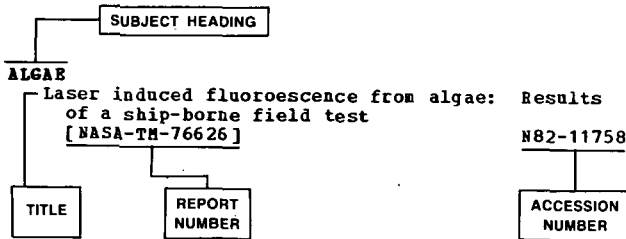
During three visual detection experiments, the USCG R&D Center collected human factors information. Various human factor parameters thought intuitively to affect the performance of a lookout were measured and analyzed. These included experience level, time on watch, amount of sleep, and lookout position. In addition, Hidden Pattern and Figure Tests were administered to the lookout subjects in these studies. This report presents the results of this pilot study. Lookout subjects from HH-3F and HH-52A helicopters, 82-ft patrol boats (WPBs), 210-ft medium endurance cutters (WMECs), and 41-ft small utility boats (UTBs) were included. Time on watch was found to have a marked influence on performance of lookouts on surface units. A marginal relationship was found between test scores and performance. Data from an experiment dedicated to human factors parameters is necessary for a proper investigation. Author (GRA)

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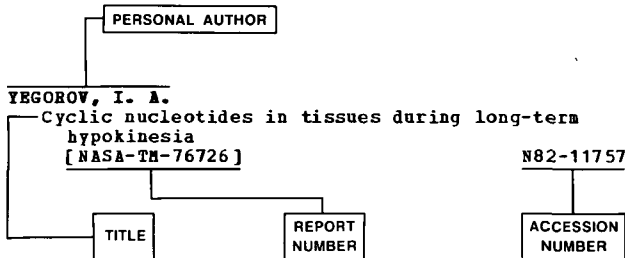
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